

**DEPARTMENT OF THE ARMY  
U.S. ARMY PATHFINDER SCHOOL  
THE ARMY NATIONAL GUARD WARRIOR TRAINING CENTER  
FORT BENNING, GEORGIA 31905**

REFERENCE MATERIAL: FM 4-20.197/198/199  
FM 3-21.38  
FM 4-20.102

**ATSH-TPP-HQ**

**071A0203**

**03 January 2011**

**SLINGLOAD OPERATIONS ADVANCE SHEET:**

**INSTRUCTIONAL INTENT:** The Pathfinder student will learn the responsibilities of the different units and elements involved in sling load operations, the capabilities and characteristics of the equipment used, the basics of sling load theory, ground crew safety procedures and responsibilities, and the hand and arm signals. The student will also be exposed to the methods of rigging common loads.

**A. Unit Responsibilities:** There are three elements involved in sling load operations: The supported unit (the unit whose equipment will be moved), the supporting unit (the aviation unit that will fly the loads) and a Receiving element (normally an internal element of the supported unit). The responsibilities of these units and element are outlined below.

**1. Supported Unit:**

- a. Advance coordination with the supporting unit no later than 24 hours prior to the mission.
- b. Actual rigging of the loads.
- c. Furnishing slings, straps, clevises and any other sling load equipment required for the move.
- d. Assuring that the loads are properly rigged and do not exceed the Allowable Cargo Load (ACL) of the aircraft.

**2. Supporting Unit:**

- a. Ensure that the loads fall within the transporting aircraft's ACL.
- b. Provides assistance in the recovery and return of sling-load equipment.
- c. Advises the supported unit on load limitations.
- d. Advise the supported and receiving units on the suitability of selected LZ/PZ's.
- e. Establish coordination with the supported and receiving units.

**3. Receiving unit:**

- a. Selecting, preparing and controlling the landing site to include communications.
- b. Receiving and derigging the load.
- c. Ensure proper supervision of the derigging.
- d. Provide the return of lifting equipment and or personal.

#### **4. Pathfinder Unit**

- a. Provide advice and aid to the supported, aviation, and receiving units.
- b. Provide expertise in the planning and execution of both PZ and HLZ operations.
- c. Supervise the rigging and inspection of all the loads.
- d. Provide ground guidance and air traffic control during the slingload.
- e. Ensure that the loads fall under the transporting aircraft's ACL.

### **B. Equipment Characteristics and Capabilities:**

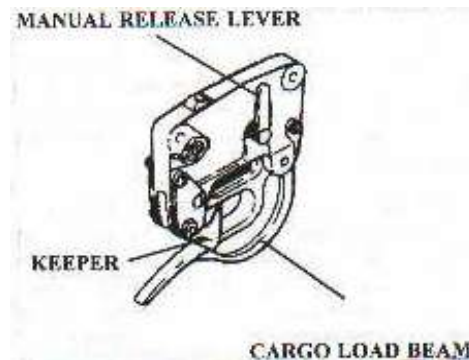
#### **1. Helicopter:**

- a. **Types of Loads:** All external loads fall under one of three types: high density, low density, or Aerodynamic. Each exhibits unique characteristics in flight. Pathfinders determine the type, size, and weight of the load during the planning phase of the operation.
- b. **High Density-** The high density load offers the best stability.  
(Example: HMMWV)
- c. **Low Density-** The low density load offers the least stability.  
(Example: A22 Cargo Bag)
- d. **Aerodynamic-** The aerodynamic load is unstable until the load is streamlined then it becomes stable (Example: Downed Aircraft)
- e. Maximum external load capabilities will vary due to the environmental conditions and the helicopter performance. Check with the aviation unit as to the aircraft maximum load capacity for a particular mission.
- f. **The Allowable Cargo Load (ACL):** The maximum load capacity for a particular mission determines what the helicopter can lift. The ACL is based on the type of aircraft, age of the airframe, pilot experience, aviation unit's SOP, Humidity, Altitude above sea level, and Temperature. (T.A.P.A.H.A.T.)



### UH-1 IROQUOIS

**APEX Requirements:** A nylon point of attachment, such as a 3 ft apex ring or a basket hitch, or a polyester round sling, must be used to attach the load to the aircraft. In addition the 11k reach pendant can be used on the UH-1 series Aircraft since it can rotate 360 degrees. The cargo hook on the UH-1 is stationary and using a standard apex with a heavy load may bind on the hook, causing the hook to shear off.



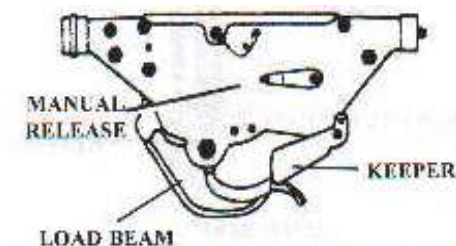
**CARGO HOOK TENSILE STRENGTH: UH-1N - 5,000 LBS**  
**UH-1Y - 5,000 LBS**

(CARGO HOOK IS STATIONARY)



## UH-60 BLACKHAWK

**APEX Requirements:** When using the 10k apex to secure an external load to the UH-60, the aluminum apex spacer **MUST** be used. This will center the apex on the cargo hook and prevent the apex from lifting the keeper during oscillation of the load, which would result in the load being jettisoned from the cargo hook. If the 25k apex is used, the spacer is not required. If the 25k apex spacer is used, the air crew cannot jettison the load if required and the cargo hook must be manually operated by the crew chief or ground crew on the LZ. **NEVER** use a nylon point of attachment such as a donut/web ring on a UH-60. The web ring will bind on the hook and prevent the crew from releasing the load in an emergency situation.

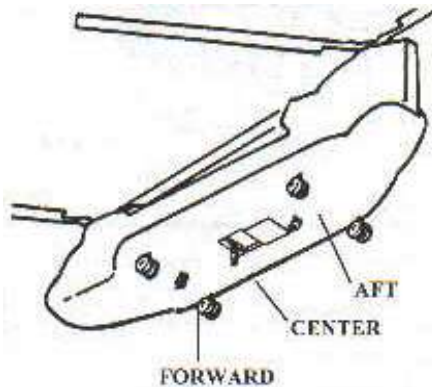


## UH-60 CARGO HOOK SYSTEM

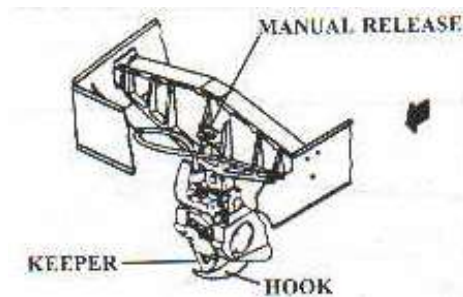
**TENSILE STRENGTH:** A MODEL - 8,000 LBS  
 L MODEL - 9,000 LBS  
 M MODEL-9,000 LBS

**(CARGO HOOK ROTATES)**

## CH-47

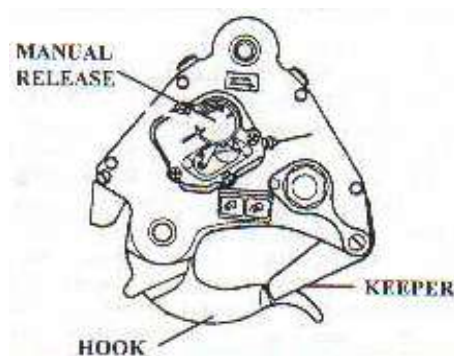


### CH-47 MAIN CARGO HOOKS



### LOCATION & TENSILE STRENGTH

**CH-47 CENTER CARGO HOOK (CARGO HOOK ROTATES)**  
**D MODEL - 26,000 LBS**  
**F MODEL - 26,000 LBS**



**CH-47D/F FORE AND AFT CARGO HOOKS**  
**(CARGO HOOK IS STATIONARY)**  
**EACH - 17,000 LBS**  
**COMBINED - 25,000 LBS**

**APEX Requirements:** The CH-47 requires no special apex preparation and may accept all configurations to include 10K Apex with spacer & 25K apex with and without spacers and any nylon apex configuration, and field expedient attachments to include all clevises.

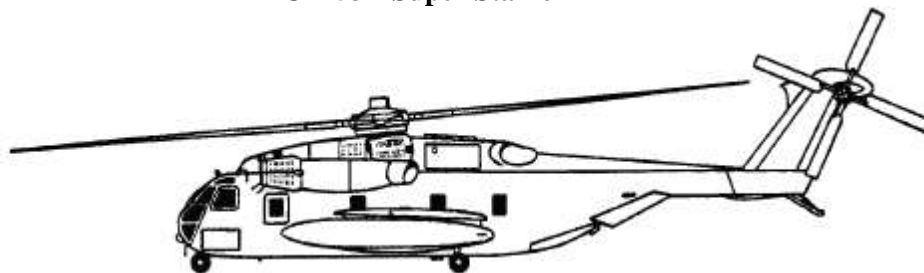
When attaching loads of different weights to multiple cargo hooks on the CH-47, such as attaching three cargo nets, attach them in the following manner:

- 1) Heaviest load on the center hook
- 2) Next heaviest (mid-weight) load on the forward cargo hook
- 3) Lightest load on the aft cargo hook.

When attaching loads that are being flown to different destinations to multiple cargo hooks on the CH-47, such as attaching three cargo nets with re-supply loads for spread out units, attach them in the following manner:

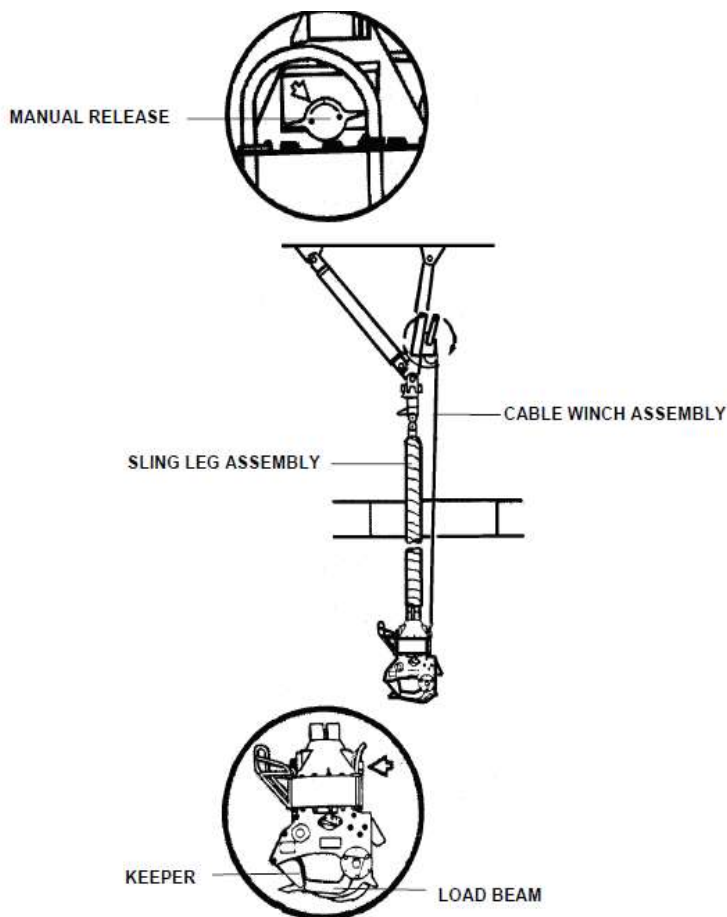
- 1) First to be delivered and lightest load on the forward cargo hook.
- 2) Second to be delivered and next heaviest (mid-weight) load on the aft cargo hook
- 3) Last to be delivered and heaviest load on the center hook

## CH-53E Super Stallion

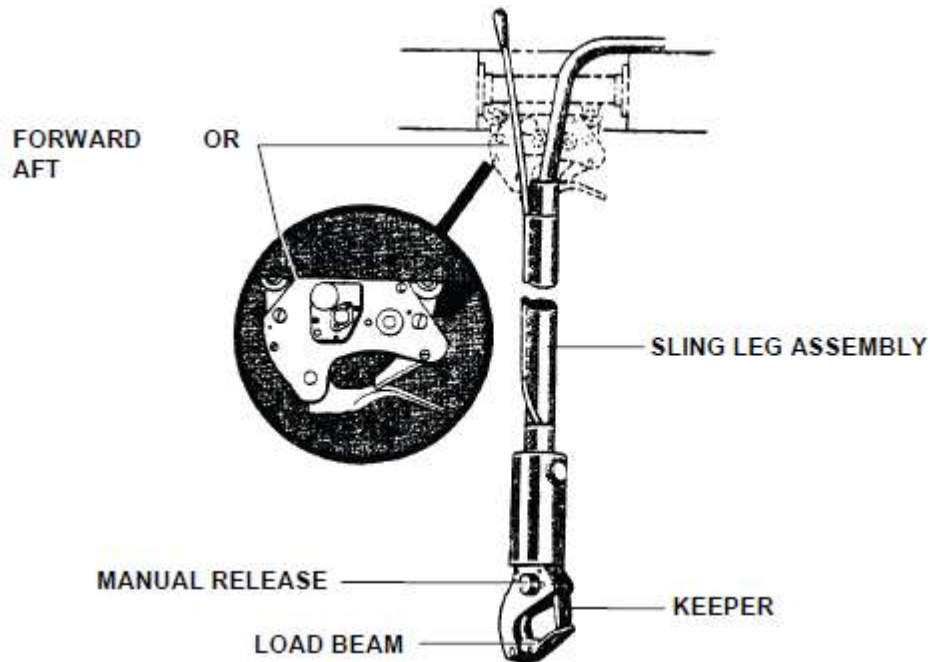


### CENTER CARGO HOOK FOR CH-53E RATED CAPACITY-36,000 LBS

The center cargo hook, suspended on the end of a pendant below the fuselage near the centerline, is used for single-point loads. Even though the hook capacity is greater (36,000 lbs.), the aircraft maximum lift capacity is 32,000 pounds. Loads under 6,000 lbs. may not jettison when needed. Therefore it is recommended you never carry less than 6,000 lbs. externally on this aircraft. The aircrew can open the cargo hook manually or electrically. A manual release knob is located on a side of the top part of the hook. In an emergency, a ground crewman can open the cargo hook by rotating the knob clockwise.



**FORE AND AFT CARGO HOOK FOR CH-53E**  
**RATED CAPACITY COMBINED: 32,000 LBS.**



A dual-point suspension system, similar to the CH-47D, uses a forward and aft cargo hook. These two cargo hooks, located 10 feet apart, must be used for dual-point loads. The aircraft maximum lift capacity, when carrying a dual-point load, is 32,000 pounds with a maximum of 60 percent of the sling load on either the forward or aft hook. A pendant specifically designed for the CH-53E is used with the dual-point system to provide additional clearance between the helicopter and the hookup team. The aircrew can open the forward or aft cargo hook electrically or manually. A manual release lever is located on the left side of the cargo hook. In an emergency, the ground crew can open the hook by moving the manual release lever up.

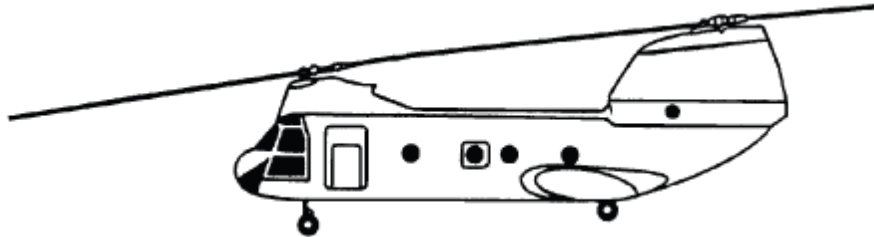
The pendant cargo hook is not opened electrically. The aircrew member opens the pendant cargo hook by pulling on the lanyard inside the aircraft. The ground crew can rotate the manual release knob on the side of the cargo hook to open the hook. The ground crew must also re-latch the pendant cargo hook after it is opened each time.

**\*NOTE:** There are no apex restrictions for the CH-53 Super Stallion; therefore it can accept all points of attachment.

**\*NOTE: When attaching multiple loads to the CH-53E, when NOT using Cargo Hook Reach Pendants, each hook being utilized must have its own static discharge man.**

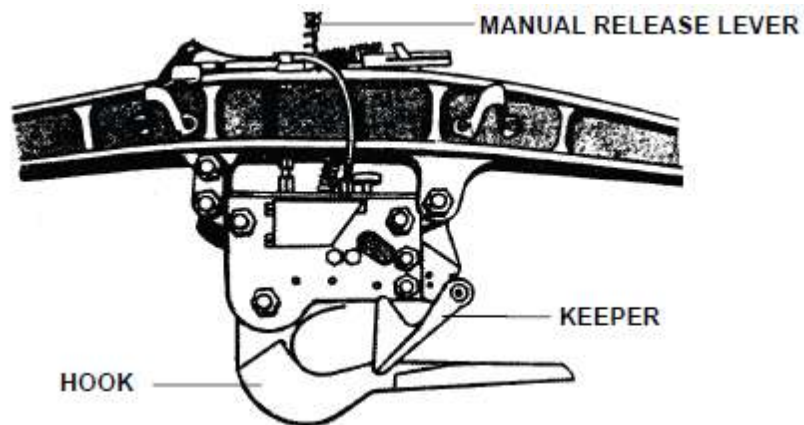


## CH-46 A/D/E SEA KNIGHT



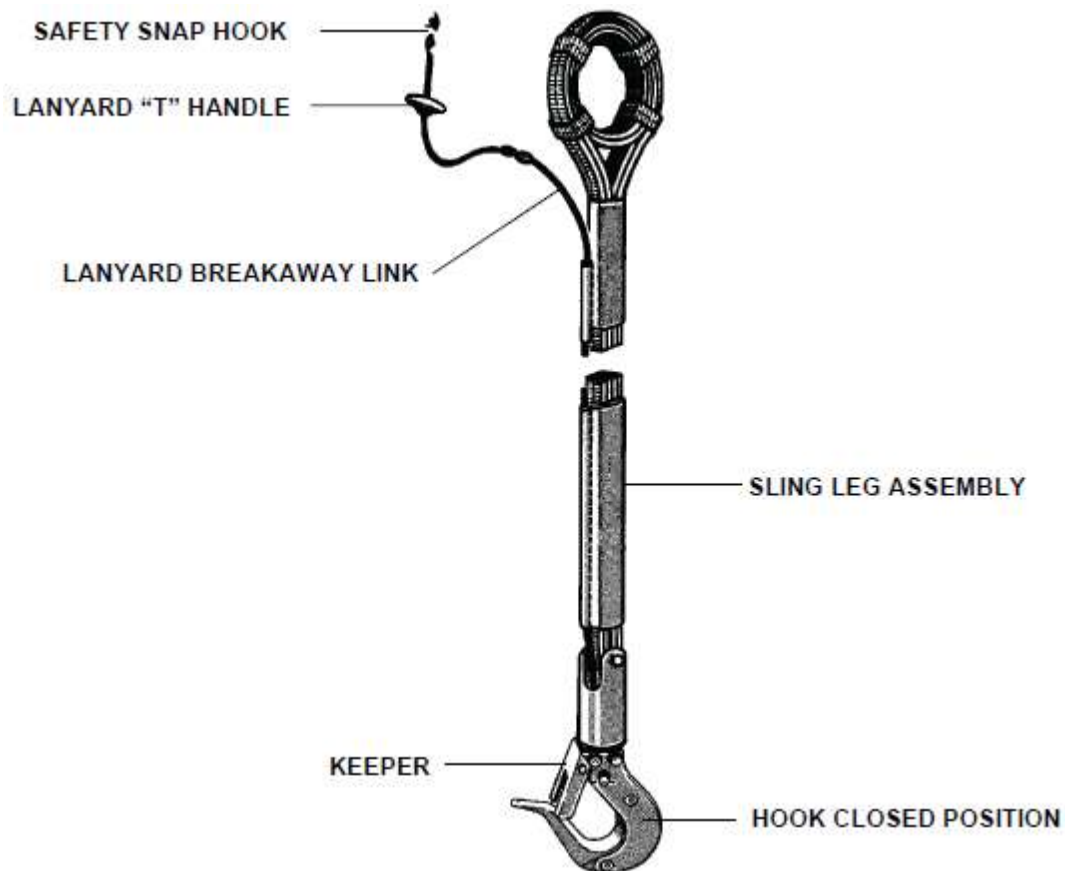
**CH-46A/D/E** The CH-46A/D/E Sea Knight is a twin engine, tandem rotor helicopter. The cargo hook maximum capacity is 10,000 pounds. The AC6000500 Mod-1 pendant may be used with this helicopter. The cargo hook is normally opened electrically or manually by the aircrew. The manual release cable is mounted on top of the cargo hook and is only accessible to the aircrew.

### CH-46 CARGO HOOK ASSEMBLY RATED CAPACITY: 10,000 LBS

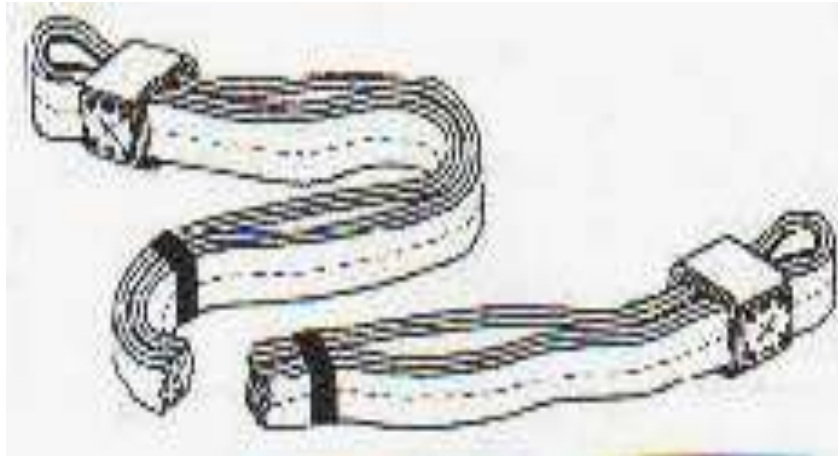


\*NOTE: The CH-46 SEA KNIGHT only has one cargo hook and **it is stationary**. There are no apex restrictions for the CH-46 Sea Knight therefore it can accept all points of attachment.

AC6000500 Mod 1 Pendant  
RATED CAPACITY: 12,000 LBS



## AERIAL DELIVERY SLINGS



### TYPE XXVI MULTI-LOOP LINE

#### MAXIMUM RATED CAPACITY

NUMBER OF LOOPS	PENDANT	LIFTING PROVISION
2	8,900 LB	5,600 LB
3	13,500 LB	8,500 LB
4	17,800 LB	11,200 LB
6	27,000 LB	17,000 LB

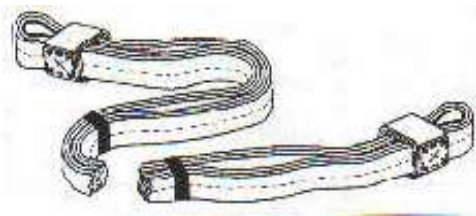
#### LENGTHS

NUMBER OF LOOPS	LENGTHS AVAILABLE
2	3'-9'-11'-12'-16'-20'-120'
3	60'-140'
4	3'-9'-11'-12'-16'-20'-28'
6	60'-120'

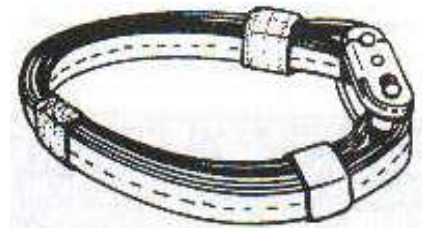
2. **Equipment:** There is currently a variety of equipment in the Army's inventory either adapted or designed for use in sling load operations.
  - a. Aerial Delivery Slings (ADS):
    - 1). **NYLON FLAT-WEB SLINGS:** Currently there is only one type of nylon flat-web sling authorized for rigging external loads, the Type XXVI nylon multiloop lines.
      - a). A yellow thread stitched lengthwise along the middle of the strap identifies the sling as a Type XXVI nylon multiloop line. A nylon or cotton buffer

must be present on the inside of the nylon web strap to help prevent damage to the sling

- b). Multiloop lines that do not have a colored lengthwise stitch are Type X nylon Aerial Delivery Slings and are **NOT** authorized for the rigging of external loads.
- c). Three Foot Apex Ring (Donut Ring): The Apex Ring (Donut Ring) is primarily used to attach the slings to the helicopter cargo hook. The Apex Ring is made by joining the two ends of a 3 foot, (2 Loop) ADS with a Type IV Connector Link. An Apex Ring has a maximum capacity of 10,000 lbs. When two Apex Rings are used together, the two Apex Rings have a maximum capacity of 17,500 lbs.



**TYPE XXVI MULTI-LOOP LINE**



**THREE FOOT APEX RING**

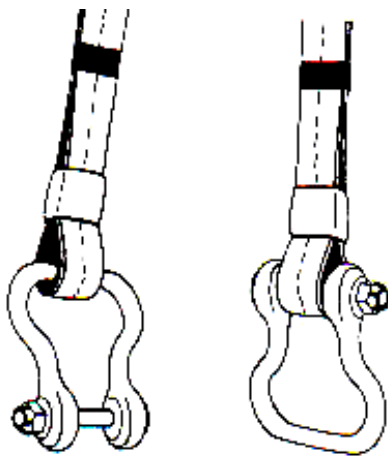
- 2). **TYPES OF HITCHES:** When connecting any ADS to metal air items or directly to the load, one of the following types of hitches will be used:
  - a). Choker Hitch: Pull the free running end of the sling around the point of attachment and draw it between the loops of the sling's standing end. After ensuring that the cotton buffer is properly in place, milk the keeper of the standing end down to secure the sling when attaching a choker hitch the point of attachment must be at least 8 inches in circumference or 2 ½ " in diameter to prevent the sling leg from failing.
  - b). Basket Hitch: Separate the loops of the sling at one end and place the sling over the suspension point. Ensure that the cotton buffer is emplaced properly, and then milk the keeper down towards the suspension point to secure the sling. The primary purpose of a Basket Hitch is to separate the sling legs.
  - c). Sling to clevis: Most commonly seen as a lifting provision.
  - d). Basket hitch on an APEX: When using a 10k or 25k apex, the spacer must be removed.



**BASKET HITCH**



**CHOKER HITCH**



**SLING -TO-CLEVIS  
ATTACHMENT  
(VERTICAL HITCH)**



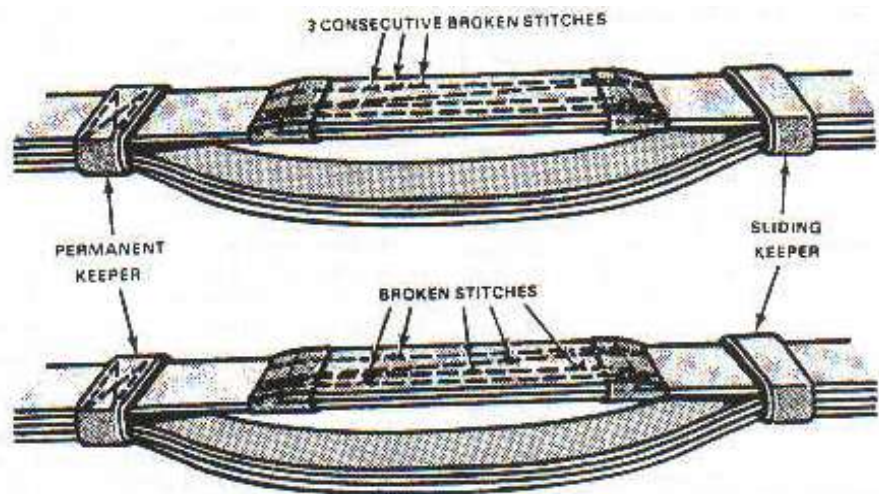
**BASKET HITCH ON AN APEX  
FITTING FOR UH-1**

c). **INSPECTION OF FLAT-WEB SLINGS (AERIAL DELIVERY SLINGS):**

A parachute rigger is no longer required to inspect the flat-web sling (ADS). The unit can conduct its own inspection. Each sling must be marked with 1-inch letters showing the date that the set was first placed in use. This means the first day the set was used, not the day of issue. The marked date is used in determining when the next required inspection is due. Although the slings are routinely inspected before and after each use, they must be thoroughly inspected every 6 months. If the sling is found to be satisfactory for use, the old date is marked over and the new date is applied. The date can be the calendar date or the Julian date. The dates will be applied using orange-yellow parachute marking ink, orange tube type marker and strata blue parachute marking ink or strata blue tube type marker. If the old date was marked with strata blue, mark over the old date with strata blue and apply the new date using orange-yellow ink. Only one date should appear on the sling. An alternate method for recording the inspection date is to attach a **metal tag** to the sling set to identify the last inspection date.

d). **SERVICEABILITY OF FLAT-WEB (ADS) SLINGS:** If the sling is unserviceable, stencil "**UNSERVICEABLE**" on it and dispose of it through supply channels. The sling set is unserviceable if one of the following defects is found:

- a). Three or more consecutive broken and/or loose stitches on the stitch pad.
- b). Five or more broken and/or loose stitches in a general area on the stitch pad.
- c). Fraying, including broken webbing strands.
- d). Excessive wear or fusing indicated by unusual hardening or softening of webbing fibers.
- e). Cuts or broken strands of the nylon webbing.
- f). Any heavy oil stains or mildewed areas.
- g). Any missing parts such as buffers, sliding keepers or permanent keepers.

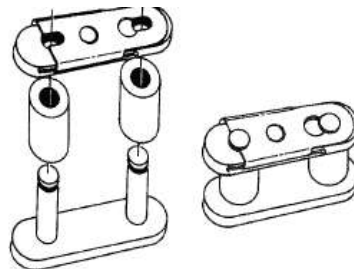


**SLING WITH BROKEN OR LOOSE STITCHES**

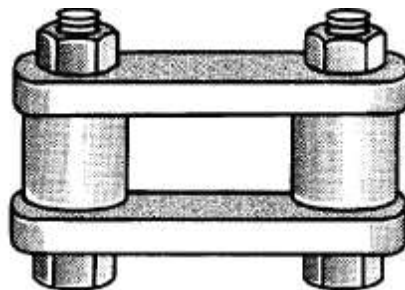
- e). **CLEANING AND STORAGE OF FLAT-WEB SLINGS (ADS):** Spot clean the slings by gently brushing or rubbing the soiled area with a soft bristle brush or clean cloth dampened with dry cleaning solvent (tetrachloroethylene). Rinse the soiled area by repeating the procedure with more of the solvent and then allow the sling to air dry. **DO NOT** wring out the rinsed area. If dry cleaning solvent is not readily available, the slings may be spot cleaned with a solution of 1/2 cup of hand washing detergent dissolved in one gallon of warm water. Rinse the area thoroughly by repeating the procedure with fresh clean water and let it air dry. **DO NOT** wring out the area or try to heat the slings to reduce the drying time. This could damage the sling. Store the sling sets in a dry area protected from direct sunlight, in a manner to prevent contact with sharp or abrasive objects and the ground.

**NOTE:** Reference for flat web slings (ADS) is FM 4-20.197/198/199  
FM 3-21.38

- 1). **TYPE IV CONNECTOR LINK:** Used in the construction of the 2 loop 3-foot Apex Ring or to connect one ADS to another.
- a). Rated capacity of 12,500 lbs.
  - b). NSN 1670-00-783-5988.
  - c). When inspecting the Type IV link assembly look for the following deficiencies:
    - Aluminum buffers not rotating freely or missing
    - Posts that is bent or cracked.
    - Bent slide connectors, No metallic "click" when locked.



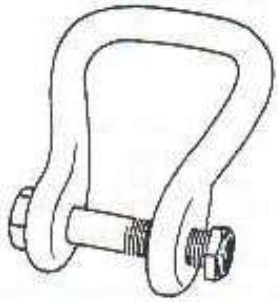
**TWO POINT LINK ASSEMBLIES:** Is used to join to ends of a four or six loop multi loop line ADS Sling together. It has a rated capacity of 25,000 lbs.



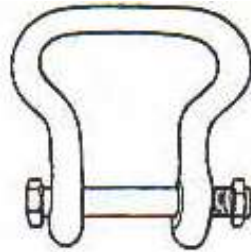


#### 4). CLEVIS ASSEMBLIES:

- a). Large Suspension Clevis: Rated capacity of 12,500-lbs (pendant)(If 2 clevis are used as attachment points -15,750-lbs, for 3 as attachment points - 23,625-lbs, for 4 as attachment points - 31,500-lbs); 7,875-lbs (lifting provision). (NSN 1670-00-090-5354)



- b). Medium Suspension Clevis: Rated capacity of 6,250-lbs (pendant) 3,750-lbs (lifting provision). 2 attachment points - 7,500-lbs, for 3 attachment points - 11,250-lbs, for 4 attachment points - 15,000-lbs); (NSN 1670-00-678-8562)



- c). Small Suspension Clevis: Rated capacity of 6,250 lbs (pendant) 3,750-lbs (lifting provision). 2 attachment points - 7,500-lbs, for 3 attachment points - 11,250-lbs, for 4 attachment points - 15,000-lbs); (NSN 1670-00-360-0304)



**\*NOTE:** When using any clevis assembly, the nut will only be tightened **HAND TIGHT**. Both ends of the nut and bolt will then be taped to prevent slippage during use. Use only case hardened nuts and bolts and **NEVER** mix items. Case hardened marks include (ticks and/or numbers / letters) and will be located on the bolt head.



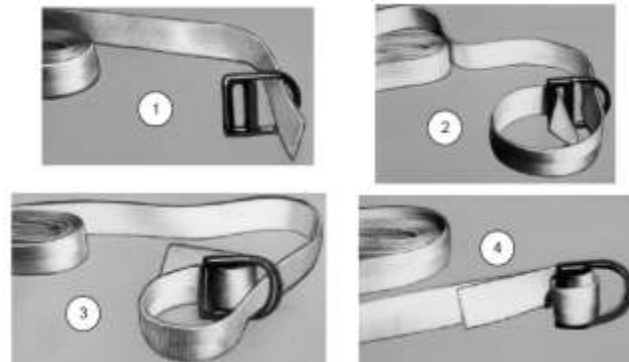
3). **INSPECTION OF METAL AIR ITEMS:** Thoroughly inspect ALL metal air items for the following deficiencies:

- a). Rust
- b). Stripped threads on the nut or bolt.
- c). Burrs
- d). Cracks
- e). Bent or twisted metal
- f). **DO NOT oil any metal air items!**

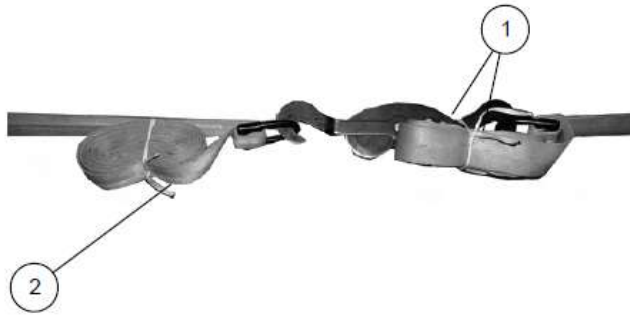
4). **CARGO TIE-DOWN EQUIPMENT:**

- a). CGU-1B Cargo Tie-down Device: Rated capacity of 5,000 lbs. Length is adjustable.
- b). 15 Foot Cargo Tie-down Strap/15' Dacron Lashing with Quick Fit Strap Fastener: Rated capacity of 10,000 lbs. Length is 15 feet
- c). Silver Load Binder, Max Rated Capacity 5,000 lbs and Black Load Binder, Max Capacity 10,000 lbs. Rated capacity of these items is stamped on the side.

Proper routing and securing of the 15' Cargo Tie Down Strap/Dacron Lashing. REF. FM 4-20.102 Rigging Airdrop Platforms.



- ① Run the free end of the tiedown strap through the large opening in the D-ring.
- ② Run the strap around and through the small opening in the D-ring.
- ③ Run the strap back through the large opening in the D-ring.
- ④ Pull the strap taut.



- ① After the handle of the load binder has been closed, roll any excess tiedown strap and place the folds alongside the load binder handle. Tie the rolled webbing to the binder and the binder handle closed with a single length of type I, 1/4-inch cotton webbing.
- ② Roll any excess from the opposite tiedown strap and place on top of the lashing. Tie the rolled webbing to the lashing with a single length of type I, 1/4-inch cotton webbing.

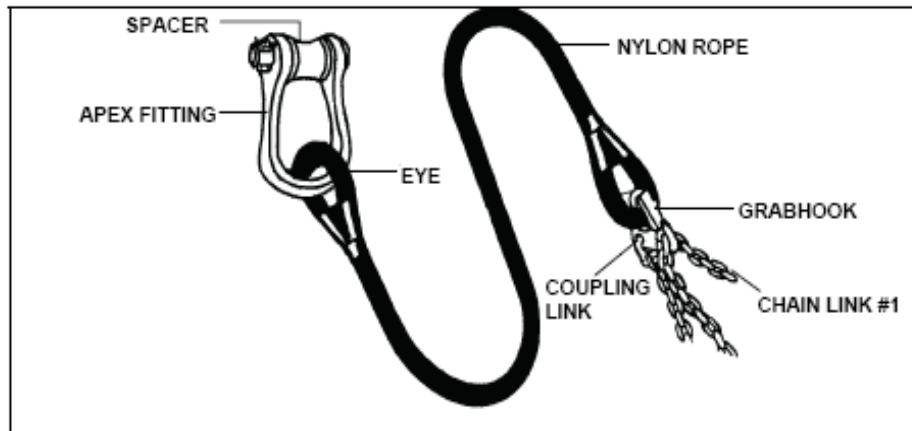
### SAFETY TIEING LOAD BINDER HANDLES

5). **A7A/188" STRAP:** A cotton or nylon cargo strap rated capacity of 500 lbs and is 188 inches in length. Located on one end of the strap is a friction adapter with a thick lipped floating metal bar. The strap is issued with one metal "D" ring. Inspect this piece of equipment for cuts or frays.

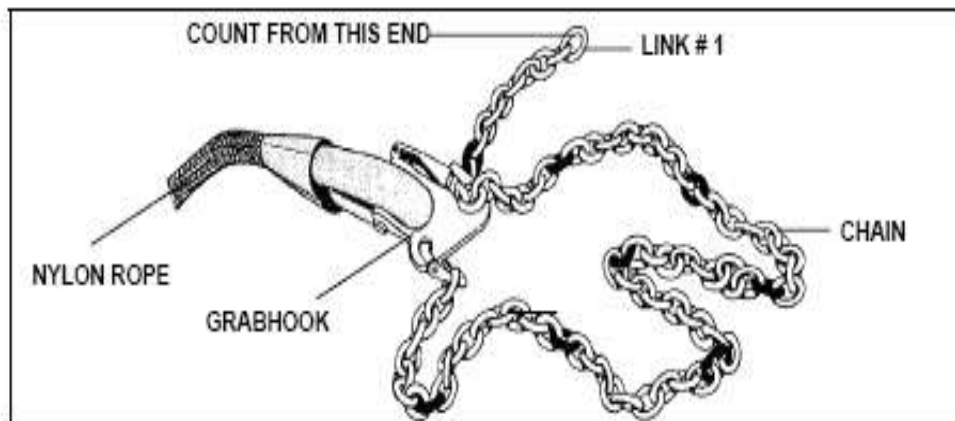
\*NOTE: When sewn into the A22 Cargo Bag, it is referred to as a 188" strap

6). **10,000 AND 25,000 POUND CAPACITY SLING SETS:** Both Sling Sets are similar, except for a few minor differences. Each set consists of four legs. Each of the legs has a rated capacity of 1/4<sup>th</sup> of the total capacity of the set. It is common to use up to six legs on some loads. The extra legs **DO NOT** increase the rated capacity of the entire set. The nylon rope assembly for each set has an interwoven eye at each end that is covered with polyurethane coating to protect the eye from abrasion. Each rope is of double braided construction and is connected to a grab hook assembly. The grab hooks for the two sets look similar but are not interchangeable due to their different ratings.

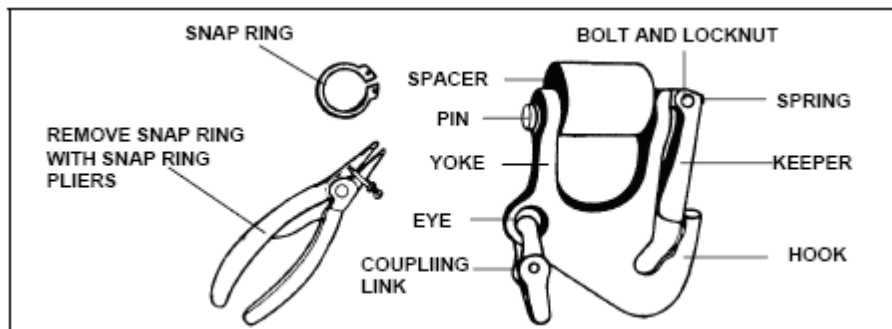
## 10,000 AND 25,000 POUND CAPACITY SLING SET COMPONENTS



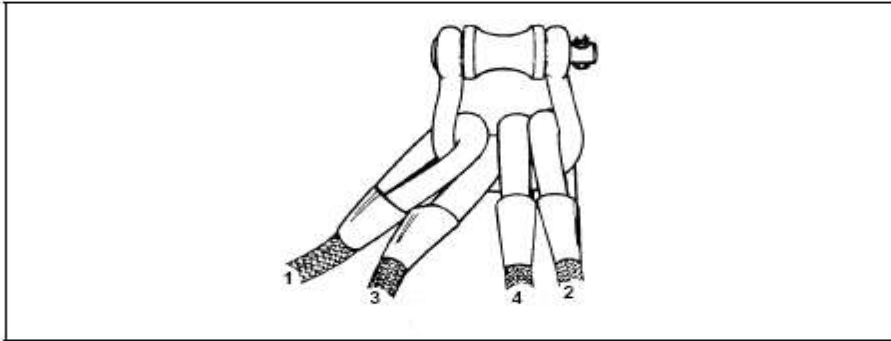
## CHAIN ATTACHED TO GRAB HOOK BY COUPLING LINK



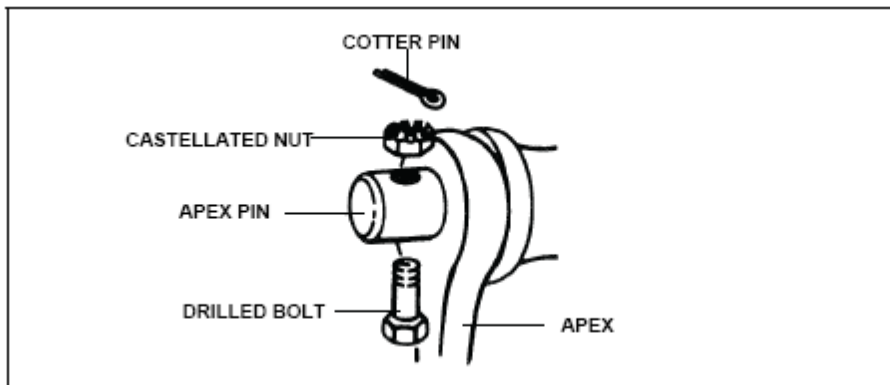
## GRAB HOOK ASSEMBLY



## SLING LEG NUMBERING SEQUENCE



The pin on both apex fittings is secured with a 3/8 inch bolt and, a castellated nut and cotter pin. When using the dome shape nut, ensure that the nut is secured to the apex wrench tight.



### 6 Component parts of the Apex fitting (10k and 25k)

1. APEX SHACKLE
2. APEX FITTING PIN
3. APEX SPACER
4. DRILLED BOLT
5. CASTELLATED NUT
6. COTTER PIN

## CHARACTERISTICS

	10,000 LB	25,000 LB
<b>APEX FITTING</b>		
Material	aluminum	alloy steel
Pin size	1 1/8 inch diameter	1 1/2 inch diameter
Weight	4 1/2 lbs	10 lbs
<b>NYLON ROPE</b>		
Rope color	olive drab	black
Length	12 feet	12 feet
Rope diameter	7/8 inch	1 1/4 inch
<b>CHAIN</b>		
Links	110 - 115	84 - 88
Length	8 feet	8 feet
<b>TOTAL WEIGHT</b>	52 lbs	114 lbs

**\*NOTE:** Reference for these slings is FM 4-20.197/198/199

**\*NOTE:** For link count conversion tables, refer to FM 4-20.197/198/199

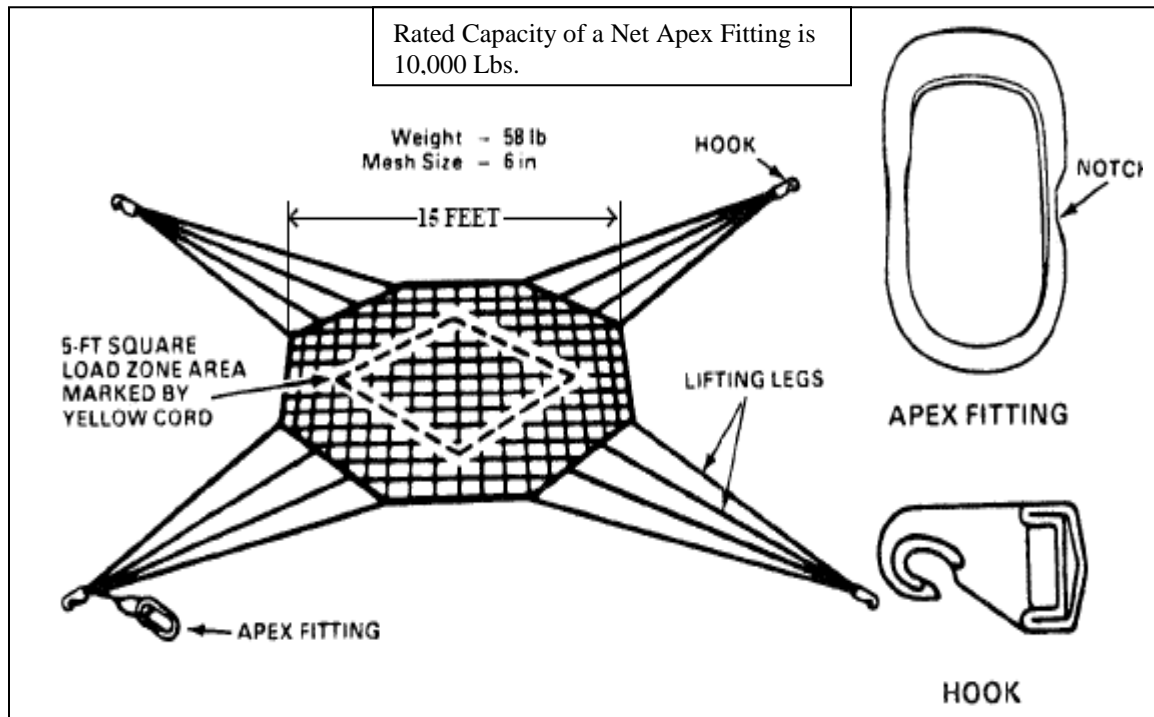
### Nets and Containers:

- 1). 5,000 lb and 10,000 lb capacity octagon shaped cargo nets are constructed from interwoven nylon cord. Each set of four lifting legs has a hook that attaches to the apex fitting that is connected directly to the aircraft cargo hook. The apex fitting is attached by a tether cord to the set of lifting legs with the net identification tag. The other ends of the lifting legs are attached to the net's outer border cord. A square-shaped load zone area is marked by a yellow cord interlaced with the mesh. This zone marks the center of the net and is used as a guide to place the load. When positioning the load, the sides of the load can extend beyond the load zone, but the overhang should be the same on each side.

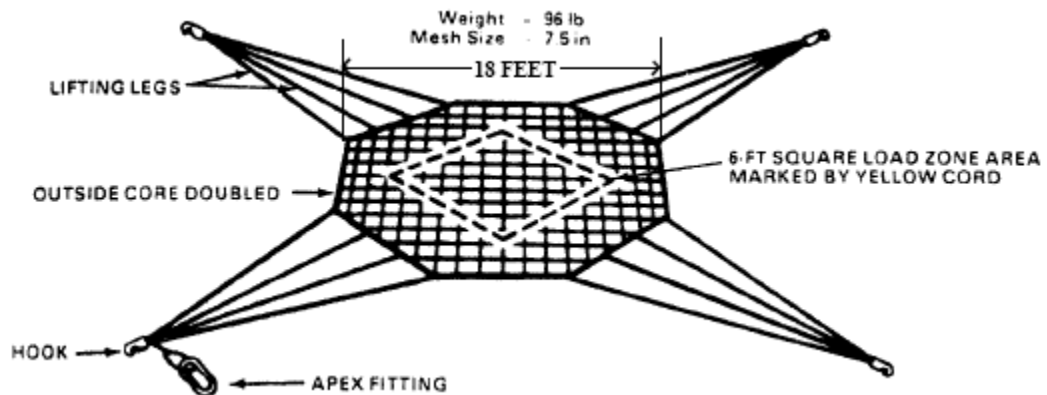
The olive drab body of the 5,000 lb capacity cargo net is 15 feet wide.

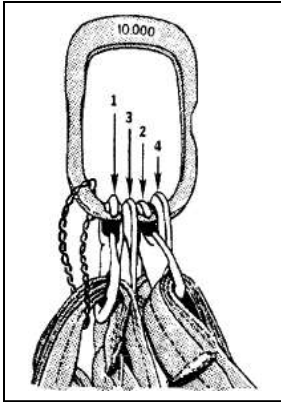
The 10,000 lb capacity cargo net is black and the body is 18 feet wide.

*5000 lb Capacity Cargo Net*  
**VOLUME = 125 CUBIC FEET**

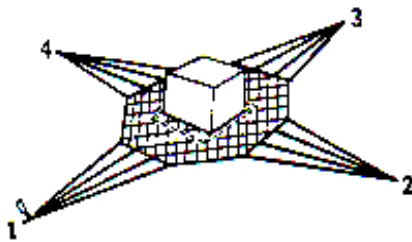
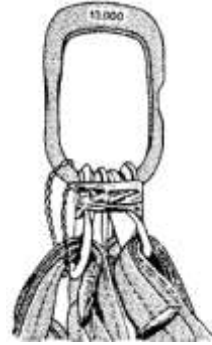


*10,000 lb Capacity Cargo Net*  
**VOLUME = 380 CUBIC FEET**

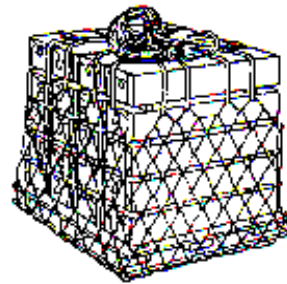




*Legs Hooked in Sequence  
Taped Hooks*



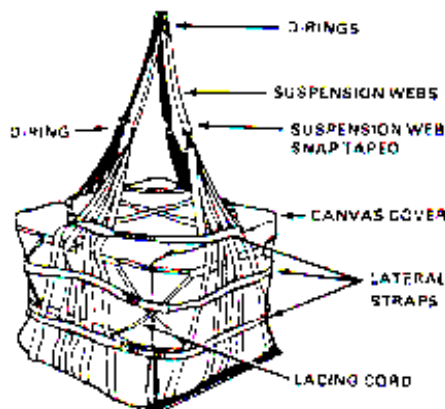
**ALIGNED LOAD**



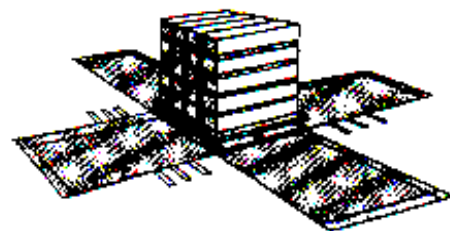
**LIFTING LEGS COILED ON  
TOP OF LOAD**

- 2). **A-22 CARGO BAG:** The A-22 Cargo Bag is an adjustable cotton duck cloth/nylon webbing container consisting of a sling assembly, cover and four suspension webs. The bag is used to transport palletized loads, loose cargo, ammunition, drums, and other general cargo. Maximum weight capacity is 2,200 pounds. You may rig the cargo in the bag with or without the cover.

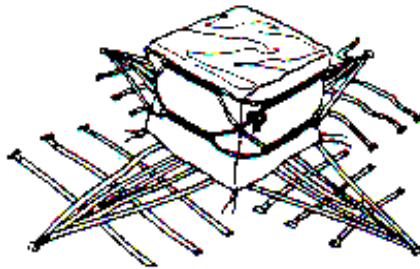
**\*NOTE:** Reference: FM 4-20.197/198/199



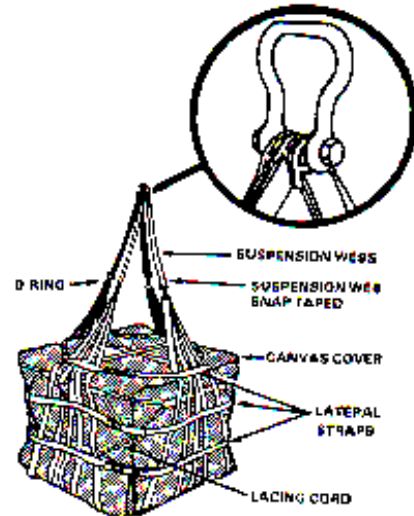
**A-22 CARGO BAG**



**CENTERED LOAD**



**SECURING THE COVER  
WITH LACING CORD**



**UPPER SLING AND  
MEDIUM CLEVIS**

### **11,000- AND 25,000-POUND CAPACITY REACH PENDANTS**

- b. **REACH PENDANTS:** A reach pendant is a synthetic rope assembly with an attached stiffened tube and a loop on each end. The built-in reach tube enables the hookup man to place the pendant's top eye on the helicopter cargo hook while the helicopter hovers at a higher distance over the load. There are two authorized reach pendants for use on sling loads:
  - (1) The 11,000-pound capacity Reach Pendant: The 11-k pendant is approximately 5 feet long with an 11,000-pound safe working load capacity. The top eye is black and has a smaller loop, while the bottom eye is green or black with a larger diameter. The safe working capacity is stamped on the reach tube. (NSN 4020-01-365-3115, part no. DSG-5-11K)
  - (2) The 25,000-pound capacity Reach Pendant: The 25-k pendant is approximately 5 feet long with a 25,000-pound safe working load capacity. The top eye is black with a smaller loop, while the bottom eye is green or black with a larger loop. The safe working load capacity is stamped on the reach tube. (NSN 4020-01-337-3185, part no. BOS-14-K7)
  - (3) To use the 11-k or 25-k reach pendants, remove the sling apex fitting pin; place the pendant lower eye in the apex fitting; and reinstall the apex fitting pin to use the pendant with a sling set.
  - (4) **Inspection:** Inspect the pendants **BEFORE AND AFTER** use. Check for cuts and tears in the nylon-urethane sheath on each loop. If the white strength member (3<sup>rd</sup> layer) is visible, remove the pendant from service.
  - (5) **Cleaning and storage:** Clean the reach pendant with a mixture of warm water and mild dish or laundry detergent. Oil and grease may be removed by using varsol or mineral spirits. The top and bottom eyes may be treated with silicone spray. Do not use silicone spray on the reach tube. Store the pendants in a clean dry area out of direct sunlight.



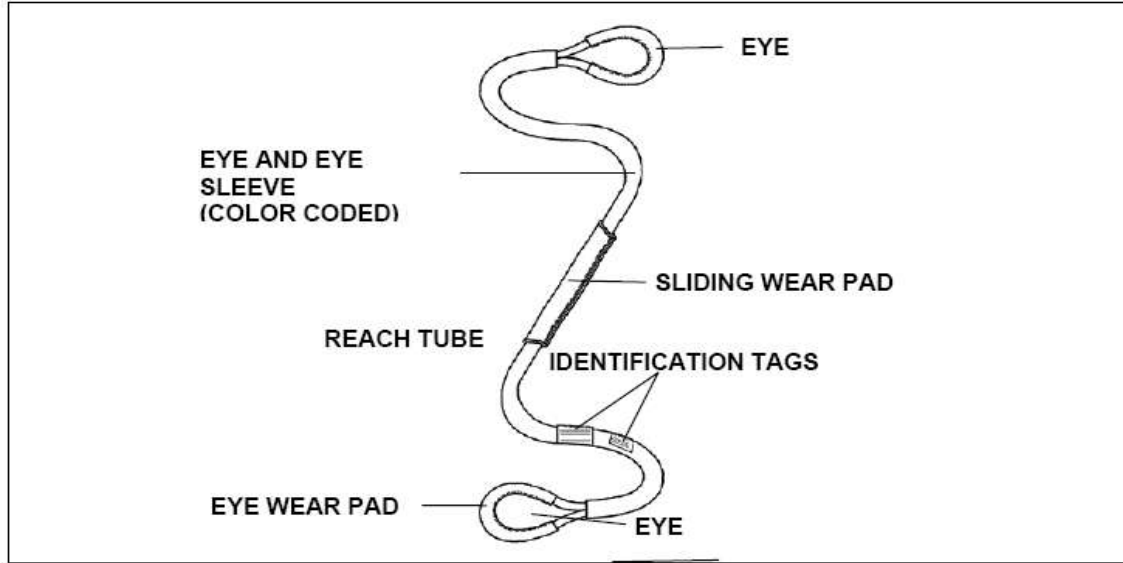
- (6) Advantage of using the cargo hook reach pendant is there is no need for a static probe man

**\*CAUTION: DO NOT** use chemical cleaners on reach pendants. Chemicals may weaken the strength members of the pendant. If a pendant becomes contaminated with chemicals, remove it from service.



**POLYESTER ROUNDSLINGS:** Polyester round slings are used primarily as a vertical pendant. The lifting capacity of polyester round slings vary with the size of the sling and the type of hitch used to attach the load. Each sling has two tags permanently sewn to the eye and eye sleeve identifying the size and capacity, as well as other important information necessary for the safe use of round slings. These slings are also color coded to designate the size of the sling.

- (1) Inspection: Inspect the round sling before and after each use. Remove the sling from service if any of the following are found:
  - (a) Both identification tags missing or not readable.
  - (b) Acid or alkali burns.
  - (c) Melting, charring or weld splatter of any part of the round sling.
  - (d) Holes, tears, cuts, snags, embedded particles or abrasive wear that exposes the core fibers.
  - (e) Broken or worn stitching in the cover that exposes the core fibers.
  - (f) Knots in any part of the round sling.
  - (g) Distortion, excessive pitting, corrosion or broken fitting(s).
  - (h) Any condition that raises doubt as to the strength of the round sling.
- (2) Storage: Store round slings in a clean dry, cool area out of direct sunlight.



### POLYESTER ROUNDSLINGS

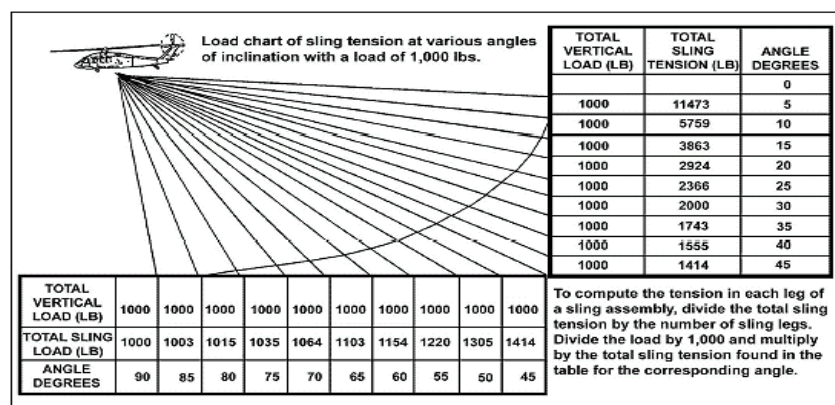
LENGTH IN FEET	COLOR	LIFT CAPACITY BY HITCH TYPE			WEIGHT
		CHOKED	VERTICAL	BASKET	
8	GREEN	4,200	5,300	10,600	4
17	GREEN	4,200	5,300	10,600	10
8	YELLOW	6,700	8,400	16,800	5
17	YELLOW	6,700	8,400	16,800	11
30	RED	10,600	13,200	26,400	26
65	BLUE	17,000	21,200	42,400	75
70	BLUE	17,000	21,200	42,400	81

**NOTE:** When attaching to an item by a choker hitch to an item of equipment there is no minimum circumference or diameter needed.

**Sling load Theory:** The behavior of an external load while in flight can greatly affect the performance of the aircraft carrying it. For this reason it is important to minimize the drag on the aircraft caused by the load. High drag coefficient will reduce the airspeed of the aircraft, reduce the amount of time that the aircraft will be available to you and could possibly endanger the aircraft and it's crew (a helicopter pilot will not hesitate to "punch a load" if he feels that his aircraft is endangered). In order to minimize drag, it is necessary to stabilize the load. There are four methods you can use to accomplish this:

1. Reduce the airspeed of the aircraft: This is the least desirable method to use. The aircraft will simply fly slowly enough so that the load does not become unstable. This burns fuel and reduces the amount of time the aircraft can fly your loads. Loads should be configured so that they will fly at speeds of **60 knots** or greater.
2. Add weight to the load: Heavier loads are less affected by the air pushing against them while they fly; hence they tend to be more stable. Ensure that you do not add so much weight that you exceed the rated capacity of your equipment.
3. Streamline the load: Long symmetric loads (two M151 trucks rigged nose to nose) fly crosswise to the direction of flight causing immense drag on the aircraft. Loads tend to stabilize in the center of gravity (CG), located in the first 1/3 of the load. By adjusting the load, and if needed, by adding weight, it is possible to move the center of gravity toward one the other end. The lighter tail end of the load will act much as the fins on a dart. The heavier end of the load will "seek" the direction of flight and the load will stabilize.
4. Sling Length: Lengthening the slings that attach the load to the aircraft reduces the load's stability in flight. The shorter, the better, as long as the sling measures **at least 6 feet long**. Also, the more vertical the attached sling, the less stress on those that are more horizontal.

**\*NOTE:** The longer the sling that attach the load to the aircraft, the less stable the load will be in flight. Additionally, the closer the angle of the slings to horizontal, the greater the stress put on them. For example, a total vertical stress of only 3,000 pounds will put a stress of 4,242 pounds on a sling at an angle of 45 degrees. As an angle decreases to 5 degrees, the stress on the sling reaches 34,419 pounds. Be aware!



Load chart of sling tension at various angles of inclination with a load of 1,000 pounds

### EXAMPLE

**PROBLEM:** 100,000 pounds weight is to be lifted by a four leg sling assembly with each leg lifting at an angle of 45 degrees. What will be the tension on one leg?

**PROCEDURE:** From the chart, the total sling tension on one leg at 45 degrees for 1,000 pounds is 1414 pounds.

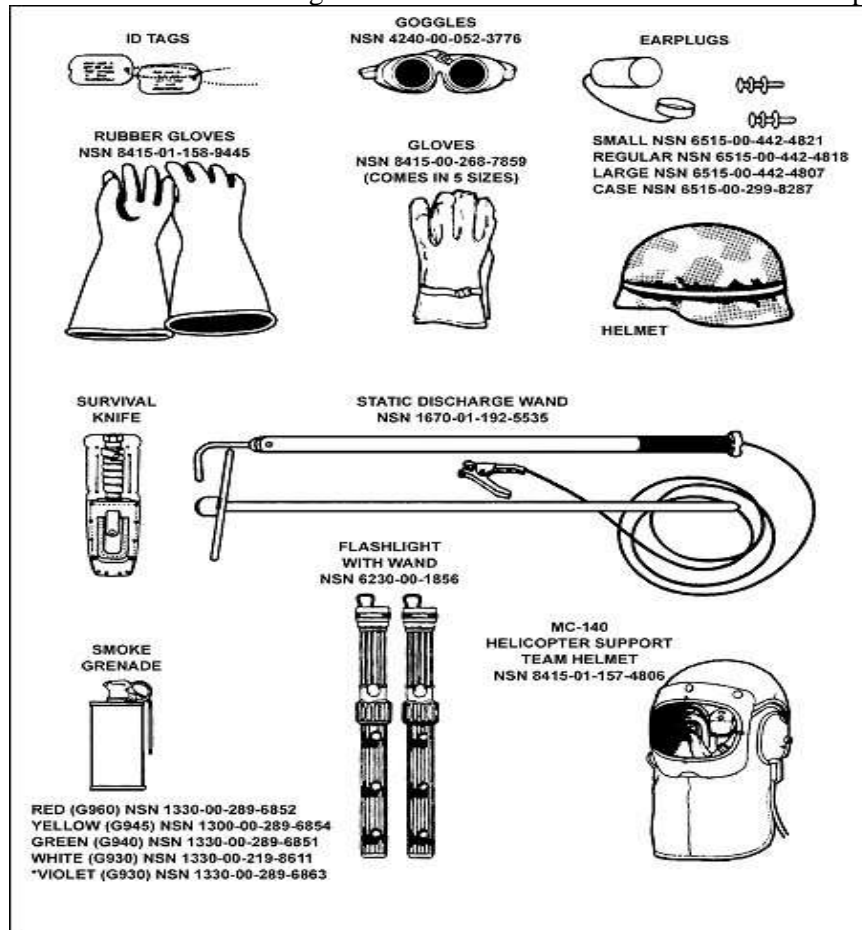
Total tension for 100,000 pounds = 141,400 pounds.

Tension on each leg =  $\frac{141,400}{4} = 35,350$  pounds.

If all legs lifted vertically, the tension on each leg =  $\frac{100,000}{4} = 25,000$  pounds

### C. Safety Measures, Hookup and Release Procedures for Helicopter External Loads:

Items illustrated below are some PPE ground crew should have to ensure maximum protection:



Safety Measures: In addition to wearing the proper equipment, the following safety measures will be enforced at the sling load site:

- a. Wear long sleeved shirts and have the sleeves rolled down and fastened. Button the shirt collar. Tuck shirttails or jacket bottoms into the trousers.
- b. Police the operational area thoroughly prior to conducting sling load operations. This can greatly reduce the amount of debris thrown about by the rotor wash.
- c. Ground crews must remain alert during hookup and release operations. Good sound judgment and common sense are the keys to success. They must be ready at all times to get clear of the load. In the past, soldiers have been crushed between the aircraft and loads, have been dragged over them or have taken an unwanted ride because they inadvertently became entangled with the load. Particular care should be exercised during hookup operations if the crew must mount the load to affect hookup.
- d. Rotor wash is the high velocity air movement under a hovering helicopter. Large helicopters, such as the CH-47 and CH-53, can generate rotor wash in excess of 120 knots. This strong wind may cause ground crew personnel difficulty in walking or standing and its force can move unsecured material. The greatest rotor wash velocity occurs between 20 and 60 feet outside the rotor disc and will diminish once the aircraft is over the ground crew. Before conducting sling load operations, brief the ground/deck crew on the rotor washes potential of the helicopter.

- **NOTE:** Slings under tension can easily crush an arm or leg against the load. Some of the particular hazards associated with loads are outlined on the following pages.

- Cargo extensions and/or projections: Gun tubes, landing gear, missile launchers, bridge planks, etc. can cause interference or injury to the ground crew by striking or tripping them. Crewmen should stand clear of such projections or position themselves so that they can immediately clear the load.
- Sharp projections, hooks and protruding handles or levers: Items such as tarpaulin tie down hooks, door handles, spare tire racks, hooked or jagged edges and similar projections should be avoided by the ground crew if possible. Serious injury can be caused by the sharp edges and a crewman could easily become hooked to the load should his clothing or part of his equipment become hooked on one of these items. Be aware and be prepared to move immediately to avoid injury.
- Top heavy or narrow based loads that can fall over under the rotor wash should be treated with caution. If possible, position these loads on their sides prior to hookup. If this is not feasible, position the crew on the side or end that is least likely to tip. The crew should be prepared to move immediately.
- High loads can cause serious injuries to crewmen who are required to climb to the top of the load to affect hookup. They may be inadvertently swept off the top of the load by the rotor wash or find it necessary to jump in order to avoid a dangerous situation. (Crewmen on top of a load must pay particular attention to where they stand. If at all possible, do not stand on the top. Stand on a lower projection or step so that should the aircraft make contact with the load, they are not caught in between). The crew should work from a crouched position or from their hands and knees. If possible, have a vehicle backed up to the load that can be used as a working platform. (Move the vehicle prior to lifting the load). The crew should use solid footholds and handholds and be ready to clear the load immediately.

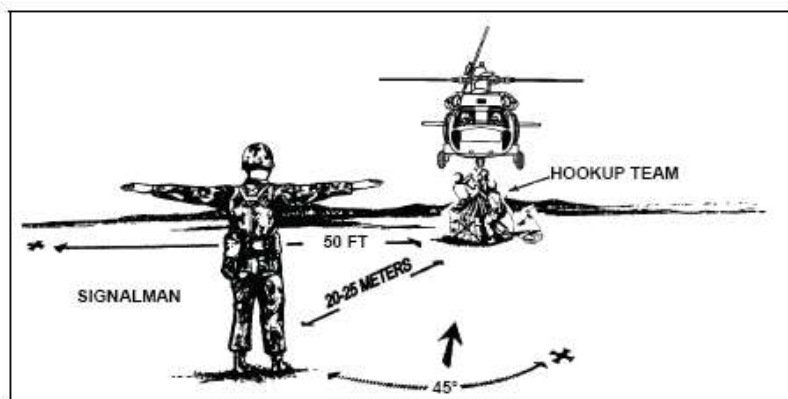
1. Ground crew emergency conduct:

- a. The signalman will be facing the aircraft. He should move to a point where he will be safe.
- b. The hookup man may be under the aircraft at the time of the emergency. They should attempt to work along the right side of the load so that they do not have to climb over or go around the load to seek safety. They would then be able to move directly off of and away from the load. If the load is a heavy piece of equipment, they may wish to keep the load between them and the aircraft while they are moving. This will offer some protection should the aircraft crash.

Hookup procedures using a ground signalman: The ground crew will normally consist of three men; the ground crew signalman and two hookup men.

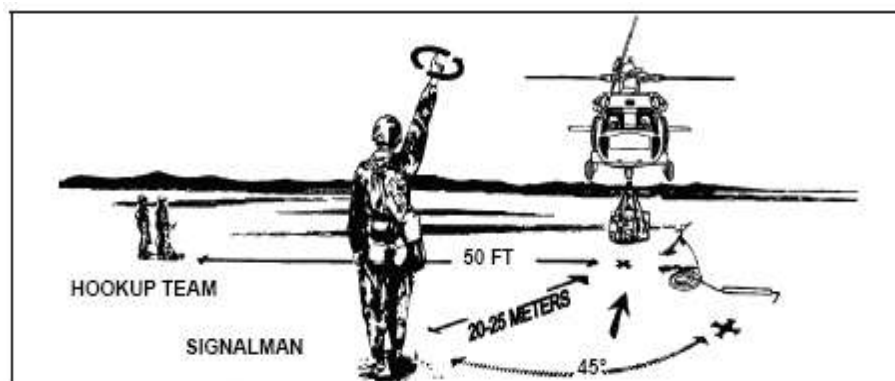
- a. Duties of the signalman:
  - 1). Prior to the arrival of the aircraft, the signalman will direct the positioning of the load. He will supervise the inspection of the load for proper routing of the slings and proper preparation. He will ensure that the load is ready to fly.
  - 2). As the helicopter approaches, he will position himself 20-25 meters in front of the load and give the hand and arm signal of "Assume guidance." As the helicopter reaches the vicinity of the load he will use hand and arm signals to position the cargo hook of the aircraft directly over the load, and close enough to the load so that the hookup men will be able to place the apex fitting onto the cargo hook. During this time it is critical that the signalman position himself so that the pilot can easily view his signals. Since the pilot of an Army aircraft is located on the aircraft's right side, the signalman will usually be located slightly to the aircraft's right. If terrain in the area forces him to place himself elsewhere, he must ensure that he is in the pilot's view at all times, regardless of where he is positioned.
  - 3). During the hookup process, the signalman must also observe the cargo hook and the apex fitting. Once hookup has been accomplished, he must hold the aircraft at a hover until the hookup men are clear of the load. When they are clear, the signalman will signal the aircraft up slowly so that the sling legs gradually take up the load. This is done to check that the sling legs are not fouled on the load. If they are fouled, the signalman will motion the pilot downward, then instruct him to cut away and the procedure will be repeated.

## RELATIONSHIP OF AIRCRAFT, SIGNALMAN AND HOOKUP CREW



- 4). If the load has been successfully suspended, the signalman will give the aircraft the signal to depart, and then move quickly aside to clear the helicopter's path. **AT NO TIME WILL THE SIGNALMAN OR ANY OTHER MEMBER OF THE TEAM ALLOW A SUSPENDED LOAD TO PASS OVER HIS HEAD.**

**WARNING:** Coordinate the evacuation route of the ground crew to a rendezvous point with the liaison officer or helicopter crew before the start of the operation. Proper coordination will prevent any mix up. Helicopter emergency procedures depend on terrain, wind direction and pilot choice. Good prior coordination will prevent the helicopter and ground crew from moving in the same direction.



## GROUND CREW POSITIONS DURING HELICOPTER TAKEOFF

- b. Duties of the hookup men: The hookup team consists of two men. One will handle the static discharge probe and the cargo hook; the other will control the apex fitting of the sling load. Hookup must be rapid to reduce helicopter hover time and minimize the exposure time of the hookup men under the helicopter. The duties of the two men is outlined below:

- 1). The hookup men will be in position at the load when the helicopter arrives.
- 2). As the helicopter hovers over the load, the hookup men position themselves so that the hookup can be accomplished quickly. They will ensure that the signalman can observe the operation at all times.
- 3). When the helicopter is in the correct position for hookup, the static probe man will ground the aircraft by contacting the static probe to the cargo hook. The other hookup man will then place the apex fitting onto the cargo hook and ensure the hook is properly closed (and locked, if required).

**NOTE:** It is futile for the hookup men to grab the cargo hook of the aircraft and attempt to pull the aircraft down to the load. Leave it alone until you are ready to attempt the actual hookup and **STAY ALERT**.

**WARNING:** Helicopters are susceptible to high levels of stored static electrical energy. Severe electrical shock may result from improper grounding of the cargo hook system.

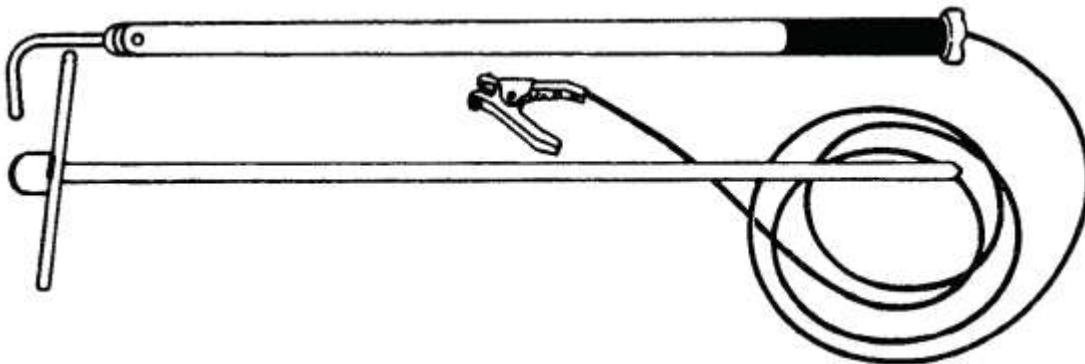
Proper Grounding Technique to Aircraft: Ground the helicopter cargo hook by touching the wand to the cargo hook. Maintain continuous grounding contact.

Wear 5,000-volt shockproof gloves, if available, when using the static discharge wand. However, these gloves are not repairable and will offer no protection from electricity if they have been damaged.

- 4). After the load is properly hooked up to the aircraft, the hookup team will move quickly aside to the designated location coordinated with the aviation unit. If any of the legs become fouled and it is necessary to re-hook the load, the same procedure will be followed.

### STATIC DISCHARGE WAND

5). to avoid the possibility of a static electric shock, ground crewmen use discharge wands (field expedient and manufactured) to ground the cargo hook. Since these wands connect the helicopter to the ground, the static electric charge is dissipated and the hookup man will not receive a shock when he connects the apex fitting to the cargo hook. Figure 3-2 shows a manufactured static discharge wand. This wand may be ordered through supply procedures. FM 4-20.197, Appendix D, page D-1, provides instructions, materials list, and a diagram needed to fabricate a field expedient static discharge wand.





### **Cleaning and storage of the static discharge wand**

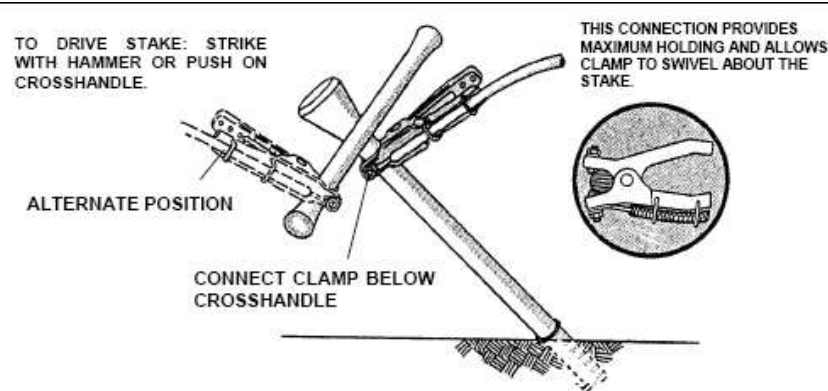
-Remove fuel, grease, or oil from wand. Remove salt water residue or dirt. Wipe dry. Contaminants on the wand may be conductive and allow an electrical discharge to travel the outside surface of the wand and reach the operator.

-Store the wand in a dry place out of direct sunlight. Turn the wand upside down and coil the cable lariat-style into several loops (12-inch diameter). With the last remaining loop, interlace the cable around the loops several times and attach the clamp to the end plug. Hang the wand upright by the wand hook. Do not attach clamp jaws to the grounding cable because you may puncture the cable insulation.

### **Operating Instructions for All Static Discharge Wands.**

-Inspect static wand to make sure it is in serviceable condition. Select the grounding rod location. The recommended location is on the side of the load opposite from rendezvous point or ground crew exit direction so that the hookup team will not trip over the cable as they depart the load. Drive the rod into the ground until firmly seated. A minimum of 6 to 8 inches is required in firm ground, 24 inches in sandy or loose soil. Drive the grounding rod in at a 45-degree angle away from the side of the load. This angle will cause the rod to bend, resulting in a less severe injury if someone should fall on it. Connect the cable clamp to the vertical shaft of the stake

-When operating on concrete or asphalt surfaces, position loads as close to the edge of the surface as possible so that the grounding rod can be driven into the ground. For shipboard operations, the cable clamp is attached to a deck pad eye or designated grounding point. Do not hold the discharge wand within 16 inches of the metal hook end. A strong static charge can jump up to 12 inches. To be effective, the grounding wand must maintain contact with the cargo hook during the hookup operation (Figure 3-4). If contact is lost, all personnel will pull back from the hook until contact is reestablished between the wand and the aircraft's cargo hook. Static electricity will begin to build up as soon as five seconds after contact has been lost



### GROUNDING ROD CONNECTION

6). Release procedures using a ground crew signalman. For this mission, the hookup men will now be called the cargo release team. As the helicopter approaches the site it will take instructions from the signalman, who will guide the aircraft into position for cargo release. The cargo release team will stand by unless they are needed to manually release the load. The signalman will direct the aircraft to set the load on the ground and then give the release signal. At this time the apex fitting should fall free of the cargo hook. If it does not, the signalman will have the aircraft hover, then direct the cargo release team to move under the helicopter and manually release the load from the cargo hook. When the load is free of the cargo hook (and the release men are no longer under the aircraft) the signalman will direct the aircraft to depart and quickly move out of the aircraft's path.

**WARNING:** If the cargo hook cannot be opened, either by activating it from within the helicopter or the action of the cargo release men, emergency cargo release procedures must be accomplished. Attempt to disassemble the donut and pass the ADS through the hook. If a clevis or apex fitting is used as the attachment point to the cargo hook, unscrew the nut and remove the pin. In some cases, it may be necessary to quickly de-rig the load so that the aircraft can set down and resolve the problem.

4. Hookup procedures during periods of white-out or brown-out will be accomplished as follows:
  - a. Due to the nature of these conditions, a signalman is not required and a hover hookup is not safe.
  - b. The load will be rigged with a 20-foot or a 40-foot extension as required using 20-foot, 2 or 4 loop ADS' and the appropriate number of Type IV link assemblies or two point link assemblies. An apex fitting will be placed at the end of the extension.
  - c. The extension will be layed to the **LEFT** of the load and the aircraft will approach normally, taxi to the location of the apex fitting and set down. Once the aircraft is on the ground, the hookup men will move to the aircraft and attach the apex fitting to the cargo hook. The aircraft will suspend the load normally and depart as directed by the GTA.

**WARNING:** When attaching the extension to skid equipped helicopters (i.e. UH-1H); care must be exercised so that the sling does not pass **THROUGH** the skid. The sling will be routed forward of the skid and then attached to the cargo hook.

## CLASSIFICATIONS OF SLING LOADS

**CERTIFIED** – Items of equipment that have been certified and evaluated and tested by Natick Soldier Center (NSC) for sling load certification.

**SUITABLE** – Have not been certified but have demonstrated acceptable static lift and flight during flight test. These loads have been flown for years and have been proven to be safe.

**UNIQUE** – Equipment carried on a one time or low frequency basis. Lack of sling load certification in itself does not preclude a unit commander from carrying a load that is not certified. This will be at the discretion of the unit commander. The name and rank of the approving authority should be printed in the bottom right corner of the remarks block on the DA 7382.

**PROHIBITED** – These loads have been denied sling load certification and are a safety hazard.

\*NOTE: The US Army Natick Soldier Center has indicated that any single point sling load certified under a specific aircraft is also certified for any aircraft with suitable lift capability.

### CAUTION

This certification is limited to single-point loads only.

## LOAD CONFIGURATION DEFINITIONS

All sling loads are configured under one of the following definitions:

**Single-Point Loads:** Single-point loads are one load rigged and one aircraft cargo hook used during flight.

**Dual-Point Loads:** Dual-point loads are one load rigged and two aircraft cargo hooks used during flight.

**Tandem Loads:** Tandem loads are two loads rigged, one in front of the other, and two aircraft cargo hooks used during flight.

**Side-by-Side (Shotgun) Loads:** Side-by-side (shotgun) loads are two loads rigged, one beside the other, and one or two aircraft cargo hooks used during flight.

## EMPLOYMENT CONSIDERATIONS

The sling load method of aerial delivery has some advantages and limitations over other methods.

**Advantages:** The advantages of sling load are:

1. The rapid movement of heavy, outsized equipment, or emergency supplies directly to the user.
2. The ability to bypass surface obstacles.
3. The rapid relocation of supplies and equipment.
4. The use of multiple flight routes and landing sites to enhance sustainability and security of ground units.

5. The establishment of multiple landing sites to support the maneuvering unit requirements.
6. Greater movement flexibility for the ground commander to accomplish the tactical mission.

**Limitations:** Some limitations of sling load are:

1. The weight of the load is restricted to the aircraft's operating capability.
2. Load instability during flight may restrict aircraft airspeed or maneuvering capabilities.
3. Adverse weather and darkness (low visibility) may limit sling load operations.
4. Atmospheric conditions (pressure, altitude, temperature, and winds) affect the helicopter's lift capacity.
5. A limited number of helicopters are available for sling load missions.
6. Landing site surface conditions may restrict helicopter operation. Loose debris, dust, and snow are safety hazards that also limit pilot visibility.
7. Landing site size must be increased during the hours of darkness or reduced visibility to allow the pilot more room to maneuver.

**RECORD, DA FORM 7382:** In order to improve sling load safety, the Department of the Army has implemented inspection procedures for **ALL ARMY** equipment being moved by sling load. All Army loads require an inspection by a qualified inspector prior to the arrival of the supporting aircraft using the Sling load Inspection Record, DA Form 7382.

1. **INSPECTOR QUALIFICATIONS:** Inspectors must meet the following qualifications:

- a. Be in the grade of E-4 or above **AND**
- b. Be a graduate of one of the following courses:
  - 1). Pathfinder
  - 2). Air Assault
  - 3). Sling load Inspector Certification
2. Distribution of the Sling load Inspection Record: The Sling load Inspection Record requires three copies to be distributed as follows:
  - a. One copy - to the supporting aviation unit.
  - b. One copy - securely taped or tied to the load.
  - c. One copy - to the supported unit.

REFERENCE: FM 4-20.197, APPENDIX I.

**\*NOTE:** The Sling load Inspection Record, DA Form 7382 may be reproduced locally pending distribution.

SLING LOAD INSPECTION RECORD			
For use of this form, see FM 4-20.197; the proponent agency is TRADOC			
1. SUPPORTED UNIT	2. ITEM DESCRIPTION AND SERIAL/BUMPER NO.		3. WEIGHT
4. SUPPORTING AVIATION UNIT	5. TYPE AIRCRAFT	6. RIGGED IAW FM NO	
INITIAL ONLY ITEMS APPLICABLE TO ITEM YOUR SPECIFIC LOAD RIGGED INSPECTED			LOAD  BY
BY			
7. VEHICLE OR LOAD			
A. CORRECTLY POSITIONED			
B. EMERGENCY BRAKE SERVICEABLE AND SET			
C. FUEL LEVEL NOT TO EXCEED 3/4 TANK			
D. PREPARED AND PADDED IAW THE APPROPRIATE FM			
8. SLING SET			
A. CORRECT NUMBER AND SIZE (10K OR 25K)			
B. INSPECTED FOR SERVICEABILITY IAW FM 4-20.197			
C. SLING LEGS PROPERLY ROUTED AND ATTACHED TO LIFT POINTS			
D. CORRECT LINK COUNT FRONT AND REAR F- R-			
E. CHAIN SECURED IN GRAB LINK			
F. EXCESS CHAIN TIED OR TAPED (10 LINKS OR MORE)			
G. BREAKAWAY TIES INSTALLED			
H. APEX ATTACHED			
I. APEX SPACER INSTALLED			
J. REACH PENDANT INSTALLED			
9. A-22 CARGO BAG			
A. INSPECTED FOR SERVICEABILITY IAW FM 4-20.197			
B. RIGGED IAW FM 4-20.197			
C. SUSPENSION WEBS ATTACHED TO CONTAINER AND TAPED			
D. CLEVIS BOLT THROUGH SUSPENSION WEB D-RINGS (4 EACH)			
10. CARGO NETS			
A. CORRECT SIZE (5K OR 10K)			
B. INSPECTED FOR SERVICEABILITY IAW FM 4-20.197			
C. LOAD CORRECTLY POSITIONED			
D. LIFTING LEGS PROPERLY CONNECTED TO APEX FITTING			
E. HOOKS TAPED			
F. LIFTING LEGS TIED (BREAKAWAY)			
G. CORRECT NUMBER AND SIZE SLING LEGS			
H. RIGGED IAW FM 4-20.197			
REMARKS:			
11. LOAD RIGGED BY:			
UNIT (PRINT)	NAME (PRINT)	INITIALS	RANK
SIGNATURE		DATE	
12. LOAD INSPECTED BY:			
UNIT (PRINT)	NAME (PRINT)	INITIALS	RANK
SIGNATURE		DATE	

## SLING CONVERSION CHARTS

10,000-POUND SLING SET CHAIN LINK NUMBER	25,000-POUND SLING SET CHAIN LINK NUMBER	40,000-POUND SLING SET CHAIN LINK NUMBER	15,000-POUND MULTILEG SLING SET CHAIN LINK NUMBER
	3		51
	4		52
3	5		53
4	6		54
5	6		54
6	7	3	55
7	8	4	56
8	9	4	57
9	9	5	57
10	10	6	58
11	11	6	59
12	11	7	59
13	12	7	60
14	13	8	61
15	14	9	62
16	14	9	62
17	15	10	No further conversions for 15,000-pound multileg sling set
18	16	11	
19	16	11	
20	17	12	
21	18	13	
22	19	13	
23	19	14	
24	20	15	
25	21	15	
26	21	16	
27	22	16	
28	23	17	
29	24	18	
30	24	18	
31	25	19	
32	26	20	
33	27	20	
34	27	21	
35	28	21	
36	29	22	
37	30	22	
38	31	23	
39	31	24	
40	32	24	

# SLING CONVERSION CHARTS (CONTINUED)

10,000-POUND SLING SET CHAIN LINK NUMBER	25,000-POUND SLING SET CHAIN LINK NUMBER	40,000-POUND SLING SET CHAIN LINK NUMBER	15,000-POUND MULTILEG SLING SET CHAIN LINK NUMBER
41	33	25	No further conversion for 15,000-pound multileg sling set
42	34	25	
43	34	26	
44	35	26	
45	36	27	
46	37	28	
47	38	28	
48	39	29	
49	39	29	
50	40	30	
51	41	30	
52	42	31	
53	43	32	
54	44	32	
55	45	33	
56	45	33	
57	46	34	
58	47	34	
59	48	35	
60	49	36	
61	50	36	
62	50	37	
63	51	37	
64	52	38	
65	53	38	
66	54	39	
67	54	40	
68	55	40	
69	56	41	
70	57	41	
71	57	42	
72	58	42	
73	59	43	
74	60	44	
75	61	44	
76	61	45	
77	62	46	
78	63	46	
79	64	47	
80	65	48	

### SLING CONVERSION CHARTS (CONTINUED)

10,000-POUND SLING SET CHAIN LINK NUMBER	25,000-POUND SLING SET CHAIN LINK NUMBER	40,000-POUND SLING SET CHAIN LINK NUMBER	15,000-POUND MULTILEG SLING SET CHAIN LINK NUMBER
81	65	48	No further conversion for 15,000-pound multileg sling set
82	66	49	
83	67	49	
84	68	50	
85	68	51	
86	69	51	
87	70	52	
88	71	53	
89	72	53	
90	72	54	
91	73	55	
92	74	55	
93	75	56	
94	76	57	
95	76	57	
96	77	58	
97	78	58	
98	79	59	
99	79	60	
100	80	60	
101	81	61	
102	82	62	
103	83	62	
104	83	63	
105	84	64	
106		64	
107		65	





ASSUME GUIDANCE

ARMS EXTENDED VERTICALLY STRAIGHT UP, PALMS FORWARD



HOVER

ARMS EXTENDED HORIZONTALLY SIDEWAYS, PALMS DOWNWARD



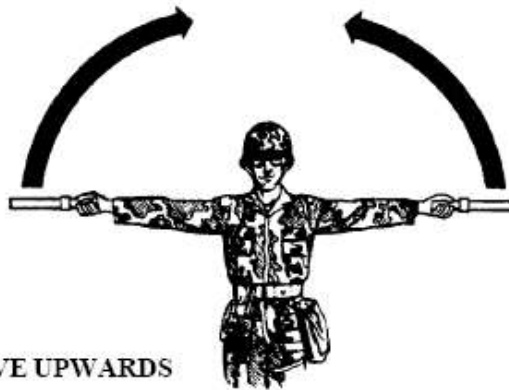
MOVE FORWARD

ARMS A LITTLE ASIDE, PALMS FACING BACKWARDS AND  
REPEATEDLY MOVE UPWARD-BACKWARD FROM SHOULDER HEIGHT



**MOVE BACKWARD**

**ARMS BY SIDE, PALMS FACING FORWARD, ARMS SWEEPED FORWARD AND UPWARD REPEATEDLY TO SHOULDER HEIGHT**



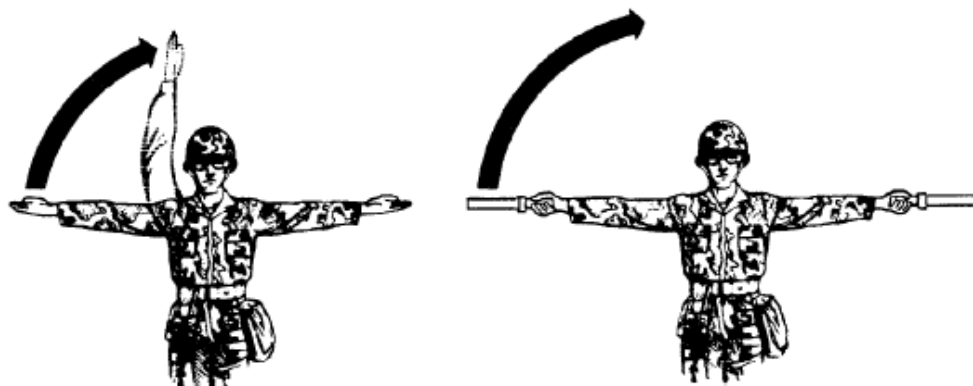
**MOVE UPWARDS**

**ARMS EXTENDED HORIZONTALLY SIDEWAYS, BECKONING UPWARDS, WITH PALMS UP**



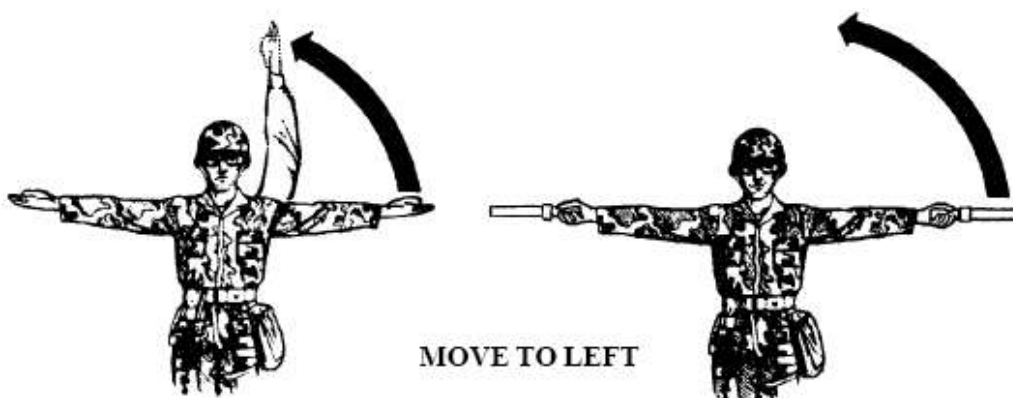
**MOVE DOWNWARDS**

**ARMS EXTENDED HORIZONTALLY SIDEWAYS, BECKONING DOWNWARDS, WITH PALMS TURNED DOWN**



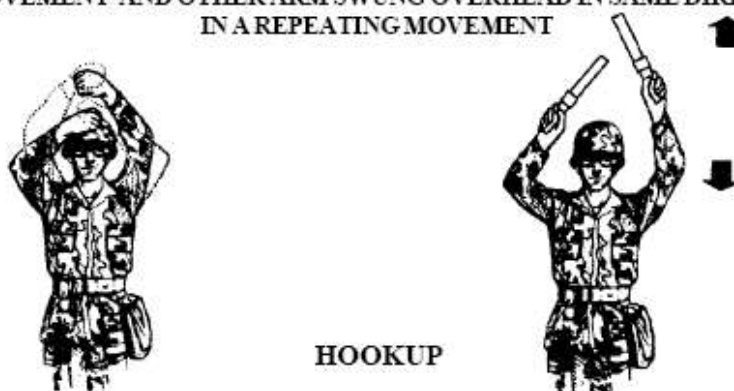
### MOVE TO RIGHT

LEFT ARM EXTENDED HORIZONTALLY SIDEWAYS IN DIRECTION OF MOVEMENT AND OTHER ARM SWUNG OVERHEAD IN SAME DIRECTION, IN A REPEATING MOVEMENT



### MOVE TO LEFT

RIGHT ARM EXTENDED HORIZONTALLY SIDEWAYS IN DIRECTION OF MOVEMENT AND OTHER ARM SWUNG OVERHEAD IN SAME DIRECTION IN A REPEATING MOVEMENT



### HOOKUP

RAISE HANDS ALTERNATELY ABOVE THE HEAD IN A "ROPE CLIMBING" MOTION TO TAKE UP SLACK



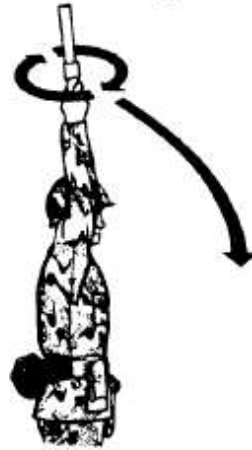
AFFIRMATIVE SIGNAL

HAND RAISED, THUMB UP



NEGATIVE SIGNAL

HAND RAISED, THUMB DOWN



TAKEOFF

MAKE A CIRCULAR MOTION WITH RIGHT HAND OVERHEAD  
ENDING IN A THROWING MOTION IN THE DIRECTION OF  
TAKEOFF ALSO MEANS LOAD CLEAR, HOOKUP GOOD



LAND



ARMS CROSSED AND EXTENDED DOWNWARDS IN FRONT OF THE BODY



STOP



HOLD ARMS CROSSED OVERHEAD, DO NOT MOVE



WAVE OFF - DO NOT LAND



CROSS ARMS REPEATEDLY OVERHEAD



### **RELEASE SLING LOAD**

**LEFT ARM EXTENDED FORWARD HORIZONTALLY, FIST CLENCHED, RIGHT HAND MAKING HORIZONTAL SLICING MOVEMENT BELOW THE LEFT FIST, PALM DOWNWARD**

## **DA Form 7382 Sling Load Inspection Record Homework**

SENERIO #1: You, the Pathfinder, are inspecting a M149A2 Water Trailer, Serial # W1896-4/Bumper # 455WT, rigged my PV2 James Smith from HHC, 1/325 AIR. The sling set used is a 10k sling set and the aircraft moving the load is a UH-60A from C Co., 82<sup>nd</sup> CAB. During your inspection you found that the right rear reflector was exposed, the trailer was filled half way with water and the rear sling leg chains were routed through the small eyelet of the rear lifting point. Given this information, properly fill out the provided DA Form 7382.

SENARIO #2: You, the Pathfinder, are inspecting a 5k Cargo Net with an estimated 9,556 pounds of cargo within the container. The load was rigged by SPC Jane Doe from A Co., 2/3 AVN BN, 3<sup>rd</sup> ID and is being picked up by a CH-47D from D Co., 3/3 AVN BN, 3<sup>rd</sup> ID. Attached to the net apex fitting, with a medium clevis, is an 11k Cargo Hook Reach Pendent. During your inspection you found that the smaller black loop of the 11k Cargo Hook Reach Pendent was attached to the load, you noticed that the # 1 leg was routed through the netting mesh and while inspecting the A7A strap you notice the folded excess portion has a ramp like effect. Given this information, properly fill out the provided DA Form 7382.

<b>SLING LOAD INSPECTION RECORD</b>			
For use of this form, see FM 4-20.197; the proponent agency is TRADOC.			
1. SUPPORTED UNIT	2. ITEM DESCRIPTION OR SERIAL/BUMPER NO.	3. WEIGHT	
4. SUPPORTING AVIATION UNIT	5. TYPE AIRCRAFT	6. RIGGED IAW FM NO.	
<b>INITIAL</b> ONLY ITEMS APPLICABLE TO YOUR SPECIFIC LOAD		LOAD RIGGED BY	LOAD INSPECTED BY
<b>7. VEHICLE OR LOAD</b>			
A. CORRECTLY POSITIONED		PFDR	
B. EMERGENCY BRAKE SET		PFDR	
C. FUEL LEVEL NOT TO EXCEED 3/4 TANK		PFDR	
D. PREPARED AND PADDED IAW APPROPRIATE FM		PFDR	
<b>8. SLING SET</b>			
A. CORRECT NUMBER AND SIZE ( <i>10k or 25k</i> )		PFDR	
B. INSPECTED FOR SERVICEABILITY IAW FM 4-20.197		PFDR	
C. SLING LEGS PROPERLY ROUTED AND ATTACHED TO LIFT POINTS		PFDR	
D. CORRECT LINK COUNT FOR FRONT AND REAR F- R-		PFDR	
E. CHAIN SECURED IN GRAB HOOK		PFDR	
F. EXCESS CHAIN TIED OR TAPED ( <i>10 links or more</i> )		PFDR	
G. BREAKAWAY TIES INSTALLED		PFDR	
H. APEX ATTACHED		PFDR	
I. APEX SPACER INSTALLED		PFDR	
J. REACH PENDANT INSTALLED		PFDR	
<b>9. A-22 CARGO BAG</b>			
A. INSPECTED FOR SERVICEABILITY IAW FM 4-20.197		PFDR	
B. RIGGED IAW FM 4-20.197		PFDR	
C. SUSPENSION WEBS ATTACHED TO CONTAINER AND TAPED		PFDR	
D. CLEVIS BOLT THROUGH SUSPENSION WEB D-RINGS ( <i>4 each</i> )		PFDR	
<b>10. CARGO NET</b>			
A. CORRECT SIZE ( <i>5k OR 10k</i> )		PFDR	
B. INSPECTED FOR SERVICEABILITY IAW FM 4-20.197		PFDR	
C. LOAD CORRECTLY POSITIONED		PFDR	
D. LIFTING LEGS PROPERLY CONNECTED TO APEX FITTING		PFDR	
E. HOOKS TAPED		PFDR	
F. LIFTING LEGS TIED ( <i>Breakaway</i> )		PFDR	
G. CORRECT NUMBER AND SIZE SLING LEGS		PFDR	
H. RIGGED IAW FM 4-20.197		PFDR	
11. REMARKS			
12. LOAD RIGGED BY:			
a. UNIT ( <i>Print</i> ) HHC 1/507 <sup>th</sup> PIR	b. NAME ( <i>Print</i> ) Pathfinder, I.M.	c. INITIALS PFDR	d. RANK SSG
e. SIGNATURE <i>J.M. Pathfinder</i>		f. DATE (YYYYMMDD) 20101225	
13. LOAD INSPECTED BY:			
a. UNIT ( <i>Print</i> )	b. NAME ( <i>Print</i> )	c. INITIALS	d. RANK
e. SIGNATURE		f. DATE (YYYYMMDD)	



<b>SLING LOAD INSPECTION RECORD</b>			
For use of this form, see FM 4-20.197; the proponent agency is TRADOC.			
1. SUPPORTED UNIT	2. ITEM DESCRIPTION OR SERIAL/BUMPER NO.	3. WEIGHT	
4. SUPPORTING AVIATION UNIT	5. TYPE AIRCRAFT	6. RIGGED IAW FM NO.	
<b>INITIAL</b> ONLY ITEMS APPLIABLE TO YOUR SPECIFIC LOAD		LOAD RIGGED BY	LOAD INSPECTED BY
<b>7. VEHICLE OR LOAD</b>			
A. CORRECTLY POSITIONED		PFDR	
B. EMERGENCY BRAKE SET		PFDR	
C. FUEL LEVEL NOT TO EXCEED 3/4 TANK		PFDR	
D. PREPARED AND PADDED IAW APPROPRIATE FM		PFDR	
<b>8. SLING SET</b>			
A. CORRECT NUMBER AND SIZE (10k or 25k)		PFDR	
B. INSPECTED FOR SERVICEABILITY IAW FM 4-20.197		PFDR	
C. SLING LEGS PROPERLY ROUTED AND ATTACHED TO LIFT POINTS		PFDR	
D. CORRECT LINK COUNT FOR FRONT AND REAR F- R-		PFDR	
E. CHAIN SECURED IN GRAB HOOK		PFDR	
F. EXCESS CHAIN TIED OR TAPED (10 links or more)		PFDR	
G. BREAKAWAY TIES INSTALLED		PFDR	
H. APEX ATTACHED		PFDR	
I. APEX SPACER INSTALLED		PFDR	
J. REACH PENDANT INSTALLED		PFDR	
<b>9. A-22 CARGO BAG</b>			
A. INSPECTED FOR SERVICEABILITY IAW FM 4-20.197		PFDR	
B. RIGGED IAW FM 4-20.197		PFDR	
C. SUSPENSION WEBS ATTACHED TO CONTAINER AND TAPED		PFDR	
D. CLEVIS BOLT THROUGH SUSPENSION WEB D-RINGS (4 each)		PFDR	
<b>10. CARGO NET</b>			
A. CORRECT SIZE (5k OR 10k)		PFDR	
B. INSPECTED FOR SERVICEABILITY IAW FM 4-20.197		PFDR	
C. LOAD CORRECTLY POSITIONED		PFDR	
D. LIFTING LEGS PROPERLY CONNECTED TO APEX FITTING		PFDR	
E. HOOKS TAPED		PFDR	
F. LIFTING LEGS TIED (Breakaway)		PFDR	
G. CORRECT NUMBER AND SIZE SLING LEGS		PFDR	
H. RIGGED IAW FM 4-20.197		PFDR	
11. REMARKS			
12. LOAD RIGGED BY:			
a. UNIT (Print) HHC 1/507 <sup>th</sup> PIR	b. NAME (Print) Pathfinder, I.M.	c. INITIALS PFDR	d. RANK SSG
e. SIGNATURE <i>J.M. Pathfinder</i>		f. DATE (YYYYMMDD) 20101225	
13. LOAD INSPECTED BY:			
a. UNIT (Print)	b. NAME (Print)	c. INITIALS	d. RANK
e. SIGNATURE		f. DATE (YYYYMMDD)	

<b>SLING LOAD INSPECTION RECORD</b>			
For use of this form, see FM 4-20.197; the proponent agency is TRADOC.			
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4. SUPPORTING AVIATION UNIT	5. TYPE AIRCRAFT	6. RIGGED IAW FM NO.	
<b>INITIAL</b> ONLY ITEMS APPLIABLE TO YOUR SPECIFIC LOAD		LOAD RIGGED BY	LOAD INSPECTED BY
<b>7. VEHICLE OR LOAD</b>			
A. CORRECTLY POSITIONED		PFDR	
B. EMERGENCY BRAKE SET		PFDR	
C. FUEL LEVEL NOT TO EXCEED 3/4 TANK		PFDR	
D. PREPARED AND PADDED IAW APPROPRIATE FM		PFDR	
<b>8. SLING SET</b>			
A. CORRECT NUMBER AND SIZE ( <i>10k or 25k</i> )		PFDR	
B. INSPECTED FOR SERVICEABILITY IAW FM 4-20.197		PFDR	
C. SLING LEGS PROPERLY ROUTED AND ATTACHED TO LIFT POINTS		PFDR	
D. CORRECT LINK COUNT FOR FRONT AND REAR F- R-		PFDR	
E. CHAIN SECURED IN GRAB HOOK		PFDR	
F. EXCESS CHAIN TIED OR TAPED ( <i>10 links or more</i> )		PFDR	
G. BREAKAWAY TIES INSTALLED		PFDR	
H. APEX ATTACHED		PFDR	
I. APEX SPACER INSTALLED		PFDR	
J. REACH PENDANT INSTALLED		PFDR	
<b>9. A-22 CARGO BAG</b>			
A. INSPECTED FOR SERVICEABILITY IAW FM 4-20.197		PFDR	
B. RIGGED IAW FM 4-20.197		PFDR	
C. SUSPENSION WEBS ATTACHED TO CONTAINER AND TAPED		PFDR	
D. CLEVIS BOLT THROUGH SUSPENSION WEB D-RINGS ( <i>4 each</i> )		PFDR	
<b>10. CARGO NET</b>			
A. CORRECT SIZE ( <i>5k OR 10k</i> )		PFDR	
B. INSPECTED FOR SERVICEABILITY IAW FM 4-20.197		PFDR	
C. LOAD CORRECTLY POSITIONED		PFDR	
D. LIFTING LEGS PROPERLY CONNECTED TO APEX FITTING		PFDR	
E. HOOKS TAPED		PFDR	
F. LIFTING LEGS TIED ( <i>Breakaway</i> )		PFDR	
G. CORRECT NUMBER AND SIZE SLING LEGS		PFDR	
H. RIGGED IAW FM 4-20.197		PFDR	
11. REMARKS			
12. LOAD RIGGED BY:			
a. UNIT ( <i>Print</i> ) HHC 1/507 <sup>th</sup> PIR	b. NAME ( <i>Print</i> ) Pathfinder, I.M.	c. INITIALS PFDR	d. RANK SSG
e. SIGNATURE <i>J.M. Pathfinder</i>		f. DATE (YYYYMMDD) 20101225	
13. LOAD INSPECTED BY:			
a. UNIT ( <i>Print</i> )	b. NAME ( <i>Print</i> )	c. INITIALS	d. RANK
e. SIGNATURE		f. DATE (YYYYMMDD)	

<b>SLING LOAD INSPECTION RECORD</b>			
For use of this form, see FM 4-20.197; the proponent agency is TRADOC.			
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4. SUPPORTING AVIATION UNIT	5. TYPE AIRCRAFT	6. RIGGED IAW FM NO.	
<b>INITIAL</b> ONLY ITEMS APPLICABLE TO YOUR SPECIFIC LOAD		LOAD RIGGED BY	LOAD INSPECTED BY
<b>7. VEHICLE OR LOAD</b>			
A. CORRECTLY POSITIONED		PFDR	
B. EMERGENCY BRAKE SET		PFDR	
C. FUEL LEVEL NOT TO EXCEED 3/4 TANK		PFDR	
D. PREPARED AND PADDED IAW APPROPRIATE FM		PFDR	
<b>8. SLING SET</b>			
A. CORRECT NUMBER AND SIZE ( <i>10k or 25k</i> )		PFDR	
B. INSPECTED FOR SERVICEABILITY IAW FM 4-20.197		PFDR	
C. SLING LEGS PROPERLY ROUTED AND ATTACHED TO LIFT POINTS		PFDR	
D. CORRECT LINK COUNT FOR FRONT AND REAR F- R-		PFDR	
E. CHAIN SECURED IN GRAB HOOK		PFDR	
F. EXCESS CHAIN TIED OR TAPED ( <i>10 links or more</i> )		PFDR	
G. BREAKAWAY TIES INSTALLED		PFDR	
H. APEX ATTACHED		PFDR	
I. APEX SPACER INSTALLED		PFDR	
J. REACH PENDANT INSTALLED		PFDR	
<b>9. A-22 CARGO BAG</b>			
A. INSPECTED FOR SERVICEABILITY IAW FM 4-20.197		PFDR	
B. RIGGED IAW FM 4-20.197		PFDR	
C. SUSPENSION WEBS ATTACHED TO CONTAINER AND TAPED		PFDR	
D. CLEVIS BOLT THROUGH SUSPENSION WEB D-RINGS ( <i>4 each</i> )		PFDR	
<b>10. CARGO NET</b>			
A. CORRECT SIZE ( <i>5k OR 10k</i> )		PFDR	
B. INSPECTED FOR SERVICEABILITY IAW FM 4-20.197		PFDR	
C. LOAD CORRECTLY POSITIONED		PFDR	
D. LIFTING LEGS PROPERLY CONNECTED TO APEX FITTING		PFDR	
E. HOOKS TAPED		PFDR	
F. LIFTING LEGS TIED ( <i>Breakaway</i> )		PFDR	
G. CORRECT NUMBER AND SIZE SLING LEGS		PFDR	
H. RIGGED IAW FM 4-20.197		PFDR	
11. REMARKS			
12. LOAD RIGGED BY:			
a. UNIT ( <i>Print</i> ) HHC 1/507 <sup>th</sup> PIR	b. NAME ( <i>Print</i> ) Pathfinder, I.M.	c. INITIALS PFDR	d. RANK SSG
e. SIGNATURE <i>J.M. Pathfinder</i>		f. DATE (YYYYMMDD) 20101225	
13. LOAD INSPECTED BY:			
a. UNIT ( <i>Print</i> )	b. NAME ( <i>Print</i> )	c. INITIALS	d. RANK
e. SIGNATURE		f. DATE (YYYYMMDD)	